OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

SEPTEMBER 18, 1950
VOLUME 39, No. 19

AMERICAN DYESTUFF REPORTER

DEVOTED TO TEXTILE CHEMISTRY • BLEACHING • DYEING • PRINTING • FINISHING

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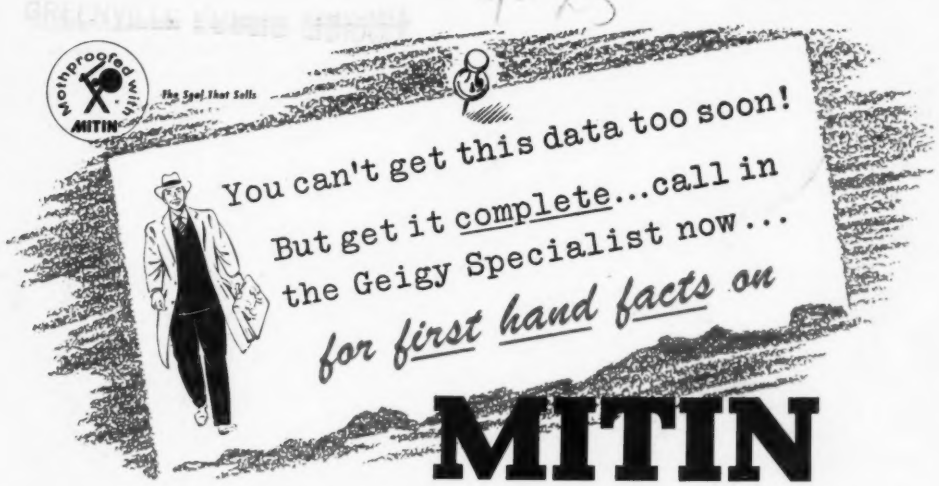
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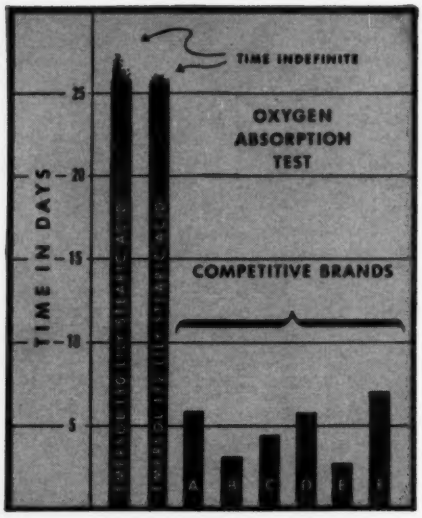

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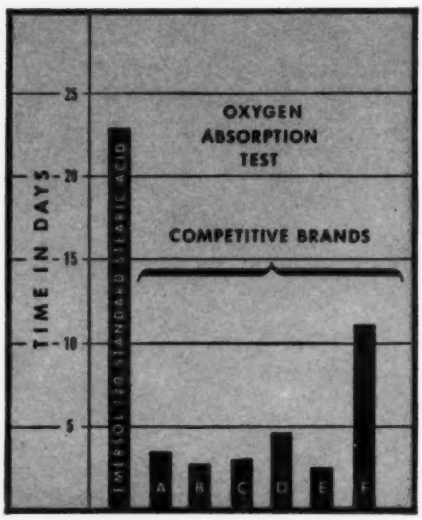

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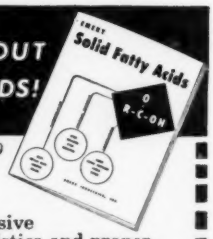

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Please send me the new comprehensive bulletin giving complete characteristics and properties of Emery's Solid Fatty Acids and their effect on finished products.

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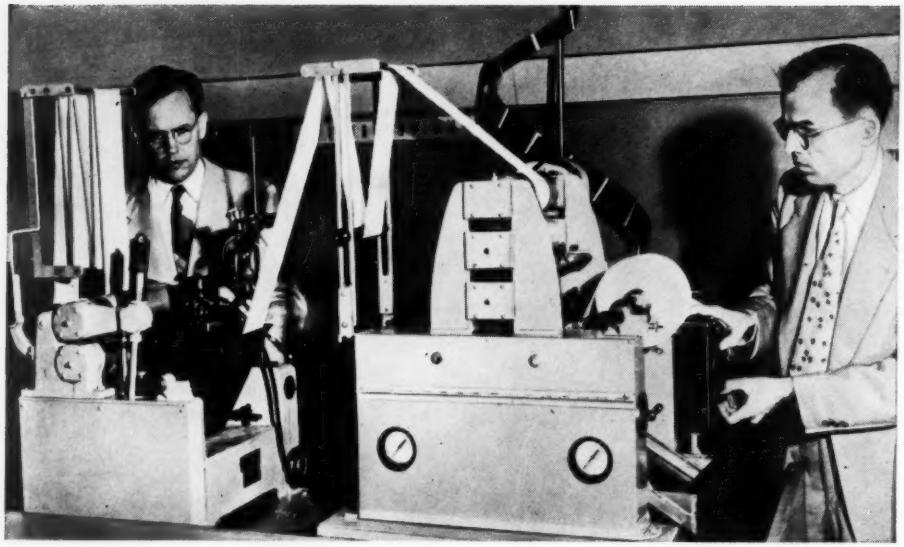

Continuous dyeing unit used in dye research at the laboratories of Calco Chemical Division, American Cyanamid Co., Bound Brook, N.J. The pad box, in the unit at left, is made of corrosion-resistant Inconel.

CALCO LAB STUDIES SHOW *INCONEL* BEST FOR HANDLING DYE SOLUTIONS

"We have used Inconel . . . and consider it the best material we know of for preventing discoloration or metal pickup in dyeing . . .

"Previous tests on dyes by our metallurgists have shown that Inconel has less effect on the dye product than any other material we have tried except glass."

The quotation above is from a report made by the metallurgist of the Calco Chemical Division, American Cyanamid Company at Bound Brook, New Jersey.

In well-equipped laboratories, Calco research men are constantly studying the many complex problems of dye production and use. To facilitate these studies, ingeniously-designed laboratory equipment simulates actual production methods. Included in this equipment is apparatus for continuous dyeing, which permits studies of color matching, shade changes, and ideal dye bath composition.

In developing this equipment, Calco designers had to overcome certain problems in materials selection . . . especially for the vital pad box which contains the dye solutions. In their own words: *"We wanted particularly to obtain freedom from rust contamination and iron pickup, since these adversely affect the shade of some dyes."*

Pad boxes made of Inconel® solved this problem to Calco's satisfaction. But that is not surprising, for Inconel is highly resistant to corrosion by most textile dyestuffs.

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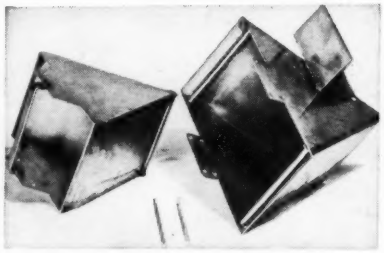

Component parts of a pad box, used in continuous dyeing apparatus at Calco Chemicals Division laboratories. They are made of Inconel to minimize metal pickup and stop rust-fouling of dye solutions.

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PROPERTIES OF N-METHYLTAURINE

APPEARANCE	
a. Near freezing point	clear, colorless solution
b. At freezing point	suspension of white crystals
RANGE OF CONCENTRATION	
a. As Free Acid (MW 139)	29.4 to 31.1%
b. As Sodium Salt (MW 161)	34 to 36%
TOTAL SOLIDS	40%
SPECIFIC GRAVITY AT 25°/4°C	1.21
VISCOSITY AT 25°C	42 Saybolt seconds
FREEZING POINT (average)	−28°C

ALKALINITY—N-methyltaurine is a weak base, and as such can take up one equivalent of acid. The GA product contains approximately 1.0% free caustic soda.

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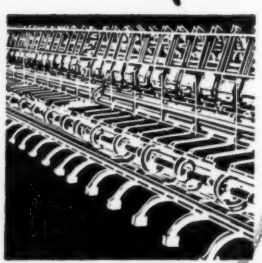

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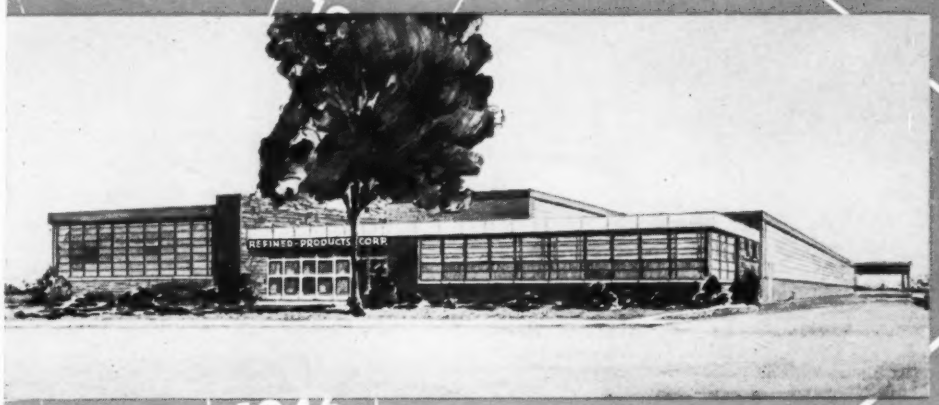

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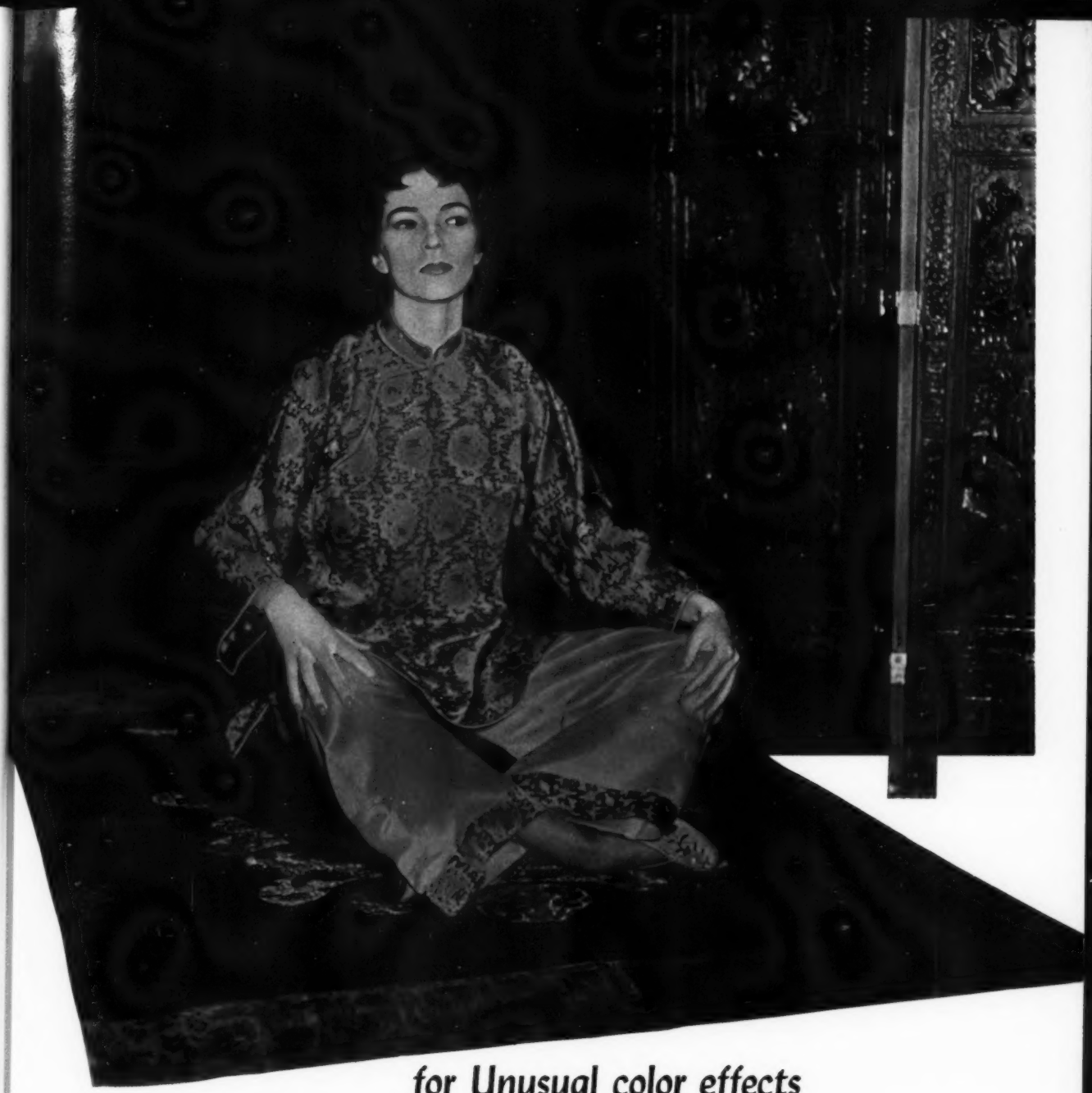

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THE FIFTEENTH ANNUAL PROCESSING REVIEW NUMBER will appear on DECEMBER 11th, 1950

One of the special features of past issues, which will be continued this year, is a listing of new products for the textile wet processing field.

You are invited to submit information concerning such products which you have brought out since November, 1949.

This information should include: the trade name of the product and a BRIEF summary of its uses. Please list each product on a separate sheet of paper. If illustrations are necessary, glossy photographs or black ink drawings should be furnished. If the trade name is registered or the product is patented and you wish this indicated, please so note.

In order to insure your products being listed in our issue of December 11th, information concerning them should be in our hands NO LATER THAN NOVEMBER 6TH.

It is important that you list ONLY those products which have been brought out since November, 1949.

The response from manufacturers in the past fourteen years has provided the basis for a most valuable and useful listing and we trust that you will again cooperate to the fullest extent.

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WHY ALGOSOLS

AN EASY ROAD TO VAT FASTNESS

ALGOSOLS are water soluble esters of vat dyes. They produce the same brilliant shades and have the same fastness properties as the parent vat dyestuffs from which they are derived. On cotton and rayon they are more level dyeing and have better penetration than ordinary vats. Prints are smoother and clearer than normally applied vat dyestuffs. On wool Algosols have superior light and wash fastness without impairment to the quality of the wool. The method of applying Algosols is simple and inexpensive.

COTTON

Mercerized cotton piece goods of constructions otherwise difficult to color, have outstanding smoothness and penetration when dyed with Algosols. The shades of colored yarns used for cross-dyed effects in striped shirtings, etc. are not affected when over-dyed with Algosols. Mercerized and other types of cotton yarn dyed in package dyeing equipment are uniform, evenly colored from outside to center and free from crossovers.

WOOL

Suitings dyed with Algosols have excellent fastness properties even in light shades. Blankets and knitting yarns have outstanding fastness to light and washing. Algosols are recommended for dyeing slubbing and yarns in circulating machines. Shrink-proofed wool dyed with Algosols has excellent fastness to light and repeated washings. Wool can be dyed with Algosols without impairment to the quality of the wool.

RAYON

Rayon piece goods composed of filament, spun rayon or filament-spun rayon yarn when dyed by the continuous method or on the jig have solid, clear shades and excellent fastness. Rayon skeins are easily dyed on the 'Cascade' type machine. Algosols are excellently suited for dyeing packages and cakes in pressure dyeing equipment.

PRINTING

In roller, screen and resist printing prints are smoother and colors clearer than the normally applied vat dyestuffs from which they are derived. Algosols have excellent light and wash fastness and do not crock. Blotch printed drapery fabrics have smooth grounds with excellent fastness to light and washing. Algosols are ideal companion colors for Rapidogens and Fast Color Salts.

MIXED FIBERS

Suitings and dress goods of spun rayon and wool blends dyed in solid shades meet all fastness requirements. Special effects can be obtained on cotton-wool and rayon-wool mixtures by dyeing the wool and leaving the cellulosic fibers undyed or on viscose-acetate blends the viscose can be dyed fast color and the acetate tinted to yield two-tone effects.

COST

The simplicity of application, saving in time, lower cost of chemicals, superior dyeing and printing results offset any increase in dye cost over ordinary vats in light and medium shades. Not infrequently Algosols prove cheaper in light shades.

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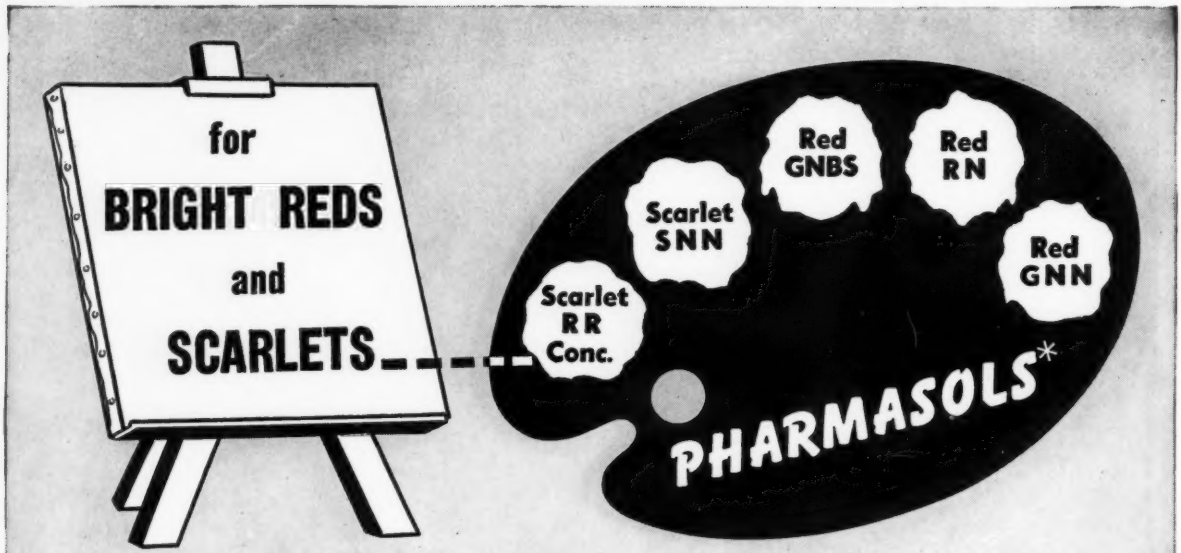
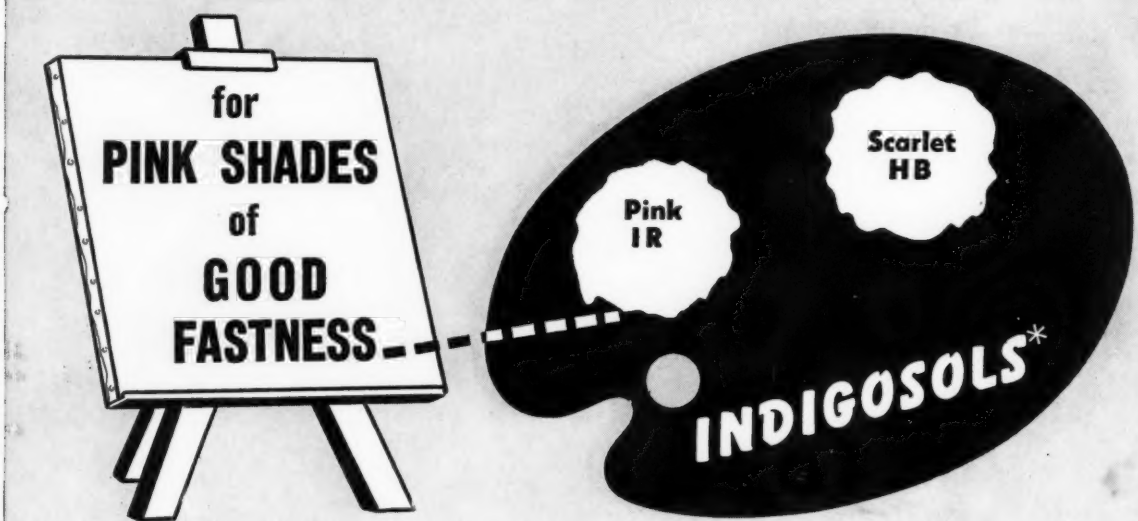


Here are the outstanding members of the group of azoic colors producing full and bright Reds and Scarlets of excellent fastness at a low cost.
PHARMASOLS are stabilized solutions, adjusted to the most practical concentration, which can be easily applied with a maximum of efficiency. As they do not decompose they overcome the problem of troublesome dissolving.



Here are two products in this soluble vat color group which are unexcelled for the production of pink shades of good fastness. They are unequalled, in the fast color group, for ease of application, clearness of tone and the solidity of color in any depth. They can be printed, padded, or dyed on any textile fibre.
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Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists

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American Dyestuff Reporter was founded in 1917 and the Textile Colorist and Converter (formerly Textile Colorist) was incorporated with it in January, 1949. Published every other Monday by the **HOWES PUBLISHING COMPANY, INC., 44 E. 23rd Street, New York 10, N. Y. C. R. Howes**, President; **Harry F. Crawford**, Executive Vice-President; **Norman A. Johnson**, Vice-President; **Ernest J. Finan**, Treasurer; **Myron D. Reeser**, Secretary; **C. Essenbreis**, Assistant Secretary.

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VOLUME 39 NUMBER 19

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ALTHOUSE

Chemical Company, Inc.

READING, PENNSYLVANIA

pace-setter in precision dye-making

AMERICAN
DYESTUFF REPORTER
VOLUME 39 SEPTEMBER 18, 1950 NUMBER 19

SOUTHERN TEXTILE EXPOSITION

THE 16th Southern Textile Exposition will be held October 2-7 at Textile Hall, Greenville, South Carolina. Visiting hours are from 9 to 7 each day except Saturday when the show will close at 1 P.M. Out of approximately 230 exhibitors there are a number that are of special interest to the textile wet processing industry. There follows brief descriptions of such exhibits.

American Safety Table Co., Inc.

Reading, Pa.
Booth 227

A new individual butt-seaming stand with casters, a totally enclosed motor with permanently sealed bearings, and individual motor drive and stand will be featured.

In attendance: J. C. Frankel, M. Voight, and R. Moreland.

American Textile Engineering, Inc.

Arlington, N. J.
Booths 480 and 494

ATE will exhibit the following:

(a) Electric Singeing Machine, Mettler's Sons, Arth, Switzerland.
(b) Autodinamografo automatic testing & recording of elongation & breaking strength of yarn, Fabriche Elettrotechniche Riunite, Milano, Italy.
(c) Oxy Neutralizer for elimination of static electricity, Herbert Products, Inc., Woodhaven, N. Y.
(d) Modern cotton ring spinning frame, Reiter & Co., Ltd., Winterthur, Switzerland.

In attendance: C. F. Dulken, President; George Westwater, John F. Dulken and W. O. Schlimbach, Home Office; C. C. Withington, Harold Mahon, J. C. Bone and W. B. Plowden, Representatives.

Bausch & Lomb Optical Co.

Rochester, N. Y.
Booths 326 & 327

This exhibit will feature the Ortho-Rater for visual classification and placement of employees, new templets of job standards and data on their application.

In attendance: C. P. Brownell and J. B. Hickey.

Birch Brothers, Inc.

32 Kent Street, Somerville 43, Mass.
Booth No. 218

Birch Brothers will exhibit various types of mill sewing machines (both chain stitch and butt-seam), a stainless steel spiral roll unit for removing wrinkles in double edges, an angular guide, a bristle brush expander, the patent adjustable slot vacuum extractor, rubber expanders, and accessories. There will be large photographs illustrating the company's line of scutchers, vacuum extractors, stainless steel open width machines with DC motor drives, mangles, inspecting machines, singeing machines, etc.

In attendance: Harold W. Birch, Manager; John J. Cosby, Southern Representative; Richard Briggs, Sales Representative.

Carolina Detergents, Inc.

Anderson, S. C.
Booth No. 321

The exhibit will include a display of the following products: floor polishing machines, electric wet mopping units, floor sealers, floor waxes, liquid soaps, disinfectants, germicides, floor cleaners, soap dispensers, towel dispensers, and other sanitary chemicals and supplies. The floor machines and floor finishes will be featured.

In attendance: Charles Seigler, Secretary; Otto Comp, Greenville District Representative; George W. Speer, Industrial Representative; Miss Catherine Duncan, Sales Promotion; W. C. Arbery, General Manager.

Clinton Industries, Inc.

Clinton, Iowa
Booth Nos. 205-B and 206

This exhibit will be primarily decorative and will feature products from corn, starches, dextrins, sugars and syrups.

In attendance: Al Junge, Manager of Bulk Starch Sales; Ray Mikkelson, Assistant Manager of Bulk Starch Sales; Bob Rau, Southeastern Sales Manager: Boyce Estes, Grady Gilbert, Frank Rogers, Southern Representatives; Walter Wentworth, New England Representative; Ed Patterson, Technical Sales Service.

Corn Products Sales Co.

17 Battery Pl., New York, N. Y.
Booth 457

The use of starch and dextrines in textiles will be shown.

In attendance: J. T. Holmes, J. A. Simpson, L. H. Kelly and W. R. Joyner.

Curtis & Marble Machine Co.

72 Cambridge St., Worcester, Mass.
Booth 202

Reception booth.

In attendance: R. L. Marble, W. F. Woodward and F. H. MacKay.

Gaston County Dyeing Machine Co.

Stanley, N. C.
Booth 131

Gaston will display automatically controlled stainless-steel beam- and package-dyeing equipment and a stainless-steel laboratory dyeing machine.

In attendance: G. H. Hacker, R. P. Craig, G. G. Hacker, A. Rhyne and Yates Craig.

The Girdler Corporation

Votator Division
224 E. Broadway, Louisville 1, Ky.
Booth 240

Votator warp-size apparatus will be displayed. It includes a compact heat transfer mechanism, combining the functions of heating, cooling, homogenizing, high speed mixing, and shearing in one operation. The apparatus, designed and built by the Girdler Corporation, is said to offer the following advantages: improved weavability, reduced breakage and shedding, starch savings, time and labor saving, and lower utility costs.

In attendance: Lamar Roy, Sales Manager; J. P. Thurman, District Manager; Harold E. Huber, Head Process Engineer; George W. Reigel, Service Engineer; Gene Wedereit, Director of Advertising.

Hart Products Corporation

1440 Broadway, New York, N. Y.
Booth 345

Hart Products will feature their product, Caro-Grant, a 100% active cotton warp sizing. The background of the display will feature a blow-up of a photograph of a typical slashing room.

In attendance: Ralph Hart, President; S. H. Hart, Treasurer; C. C. Clark, Southern District Manager; G. R. Williams, George A. Howell, Jr., and Bruce Campbell, Southern Representatives.

Hollister-Moreland Co., Inc.

11 Montgomery Bldg., Spartanburg, S. C.
Booth 227

This exhibit will feature Merrow machines, American Safety tables, Beaver cloth-cutting machines, and Trim-Masters for selvage trimming.

In attendance: R. B. Moreland, O. S. Bachelor, J. B. Moreland, L. C. Burris, E. E. Champlin, J. C. Frankel and S. Margolis.

The Johnson Corporation

805 Wood Street, Three Rivers, Mich.
Booth No. 459

The Johnson Corporation will exhibit an operating demonstrator of the Johnson rotary pressure joint as well as the type "S" Johnson joint and the Johnson Speed Heet System for cotton slashers and double drum driers.

In attendance: R. W. Gotschall and W. R. Monroe, Three Rivers Office; William T. Harding, Jr., District Representative; John Q. Marshall, Sales Engineer.

Kearny Manufacturing Company, Inc.

Kearny, New Jersey
Booths 480 and 494

The following will be exhibited: Hygrolit Machine 5AY-N Extra, built for high twist yarns; Hygrolit Conditioning Machine 14AY; Surco-5 patented conditioning device for conventional winders; and the midget psychrometer for immediate determination of moisture content.

In attendance: C. F. Dulken, President, A. R. Robbins, George Westwater and W. O. Schlimbach, Home Office; W. P. Russell, C. C. Withington, Harold Mahon and J. C. Bone, Representatives.

The Keever Starch Company

Textile Sales Division
Greenville, S. C.
Booth No. 407

Samples of Victor Mill Starch will be exhibited. All fluidities will be displayed.

In attendance: James F. Kurtz, Secretary and Vice-President; Charles C. Switzer, Division Manager; Luke J. Castile, N. C.-Virginia Representative; F. M. Wallace, Ga., Ala., Miss. Representative; E. Hays Reynolds, S. C.-Georgia Representative; James C. Jacobs, S. C.-Texas Representative; Robert E. DeLapp, Jr., Greenville Office.

Walter Kidde & Company, Inc.

Belleville 9, N. J.
Booth No. 251B

The Kidde Warp Compensator and the Kidde Twin Disc Compensator for high speed winding will be exhibited.

In attendance: C. L. Griffin, Jay S. Gosnell, D. M. Kroll and John Warwick.

Marshall and Williams Corporation

Providence, R. I. and Greenville, S. C.
Booth No. 249

The company will have the following equipment on display:

(a) The Tenterette—a short tenter frame with rails approximately 7' 6" long, using a small No. 12 tenter clip. The overall construction is reported rugged but light.

(b) Positive Overfeed with Selvage Guider—designed for positive shrinkage control. The amount of slack or overfeed on a tenter drier is controlled from —5% to 35%, it is stated. This product is manufactured exclusively by Marshall and Williams in the United States under license from Tootal, Broadhurst, Lee Company Limited of Manchester, England.

(c) M & W Selvage Guider—involves a principle of bringing the cloth to meet the rails. A photo-electric beam engages the selvage and operates the guider arm, pivoted tangent to the overfeed wheel.

(d) M & W Tenter Chains—machined roller links provide a machine driving surface for the sprocket and are said to cut the pitch in half.

In attendance: Richmond Viall, President and Treasurer; John C. Nash, Secretary and Sales Manager; Fred H. Land, Southern Manager; Albert J. Cole and John F. Smart, Sales Representatives.

Minneapolis-Honeywell Regulator Company

Brown Instruments Division
Wayne and Roberts Aves., Philadelphia, Pa.
Booths 412-414

Products to be exhibited will include:

(a) *Brown Moist-O-Graph Controller*—for indicating, recording, and controlling the regain of sized warps.

(b) *Brown Dye Kettle Controller*—for recording and controlling dye kettle temperatures. This instrument features an adjustable rate of rise and holding period and reportedly can be adapted to package systems as well as piece dyeing.

(c) *Size Cooking and Storage System.* A time-pattern transmitter will be operating in conjunction with a temperature receiver simulating actual mill operation.

(d) *Brown Electro-Pneumatic Size Level Control System.* This will be shown in actual operation in conjunction with a liquid level recorder drawing a time level curve of the level system's operation.

(e) *Brown ElectroniK Potentiometer and Brookfield Viscomat.* These will provide a continuous record of viscosity measurement.

Other displays will feature roll load-

ing, relative humidity control and accessory equipment.

In attendance: C. W. Bowden, Jr. (Textile Industry Manager), D. B. Daubert, R. J. Holt, J. W. Hughes, L. E. Kennedy, L. F. Lawrence, J. E. MacConville, G. W. Massey, W. G. Schmick, S. S. Simpson and R. T. Waits.

Morrison Machine Co.

Paterson, N. J.
Booths 101-102

Dyeing Machinery.

Morton Salt Company

1112 Johnston Bldg., Charlotte 2, N. C.
Booth No. 496

Morton will exhibit their latest improved Brinemaker and accessories.

In attendance: J. C. Drake and J. M. Culp, Engineers; L. F. Fiely, Ashley Cameron and C. J. Nadherny, Sales.

Mount Hope Machinery Company

Taunton, Mass.
Booth No. 113-A

A special feature of this display will be a running demonstration unit consisting of the following Mount Hope equipment: an automatic continuous full scray type roll feed with cloth level control and end-of-roll warning control; the new electric roll lift let-off with push button control; two types of slack selvedge eliminators; the three steel roll open width tension device; precision guiders; push-button operated bowed weft straightener and combination single and multiroll bowed weft straightener.

These devices will be arranged in such a manner that approximately 250 yards of material will be run through them continuously.

New equipment in the display will be the recently developed Mount Hope electric roll lift let off mentioned above, a modern type of center bar let-off with a push button controlled cloth roll lift. A new 1½" O.D. Mount Hope "Free Wheeling" expander for handling narrow widths of cloth, plastic film, foil or paper will also be on display.

The M. H. slack selvage eliminator will be shown in two types.

In attendance: J. B. Hammett, Sales Manager; J. D. Robertson, President; Walter P. Murray, Sales Engineer; William Bowland, Factory Representative; E. F. Slaughter and J. Fred Slaughter of the Slaughter Machinery Company, Southern Representatives.

National Starch Products Inc.

270 Madison Ave., New York, N. Y.
Booths 446-447

Starch products and chemicals for textile processing will be displayed.

In attendance: Ira Dowdee, F. Eastwood, J. Fitzgerald, Frank Greenwall and H. Olsen.

Norcross Corporation

247 Newtonville Ave., Newton 58, Mass. & 123 N. Poplar Street, Charlotte, N. C.
Booth No. 352

The Recording Viscometer for improving the uniformity of warp sizing and the mechanical Pressure Regulator for squeeze rolls will be the highlights of the Norcross exhibit.

Models will be displayed for both manual and automatic control in the Viscometer. The importance of viscosity control will be shown as well as illustrations of method of application to existing equipment.

The other phase of the exhibit will illustrate how the Pressure Regulators provide adjustable pressures which can be set for maintaining proper size content and penetration. The display will also include the latest models having single handwheel control and recent design improvements to permit mounting on existing size boxes.

In attendance: Ralph E. Howell (Southern Office Manager), Austin S. Norcross, Frederick J. Eimert, Leonard DiIoia and Stanley Van Pelt.

Oakite Products, Inc.

22 Thames St., New York 6, N. Y.
Booths 329 & 330

A complete line of specialized cleaning and related products for the textile industry will be shown. Featured will be cost-cutting materials for cleaning machinery, materials for slime removal and water treatment in mill humidifying systems, and those for safe removal of rust.

New developments in paint-stripping materials will be shown, as well as materials for descaling and prevention of scale deposition in water-cooled processing equipment. The Oakite solution-lifting steam gun for cleaning purposes will also be displayed.

In attendance: W. A. Baltzell, Southern Division Manager; main office specialists and field service representatives.

Penick & Ford, Ltd.

Atlanta 3, Ga.
Booth Nos. 437-438

Penick and Ford will exhibit corn starch, corn dextrines, corn gums, corn sugars and corn syrups. A special feature will be the presentation of the new series of Penford Gums.

In attendance: D. P. O'Connor, Vice-President; H. A. Horan, General Sales Manager; P. G. Wear, Southern Sales Manager; O. H. Steffins and Dave Lowry, New York Office; J. H. Almand, G. M. Anderson, M. C. Borden, W. R. Brown, L. C. Harmon, Jr., W. J. Kirby, C. T. Lassiter, Guy L. Morrison and T. H. Nelson.

Pontonier Chemicals, Inc.

1800 W. Roscoe St., Chicago 13, Ill.
Booth No. 328—Balcony Floor

This exhibit will feature Recoferm, a warp dressing.

In attendance: Dr. J. J. Sussmuth and Robert Worofsky.

Puritan Chemical Company

916-932 Ashby St., N. W., Atlanta, Ga.
Booth Nos. 427-428

Products to be exhibited will include floor sealing compounds; floor conditioners; maintenance products, including floor waxes and cleaners; a full line of insecticides and deoderants; and antiseptic liquid soap for use in washrooms for protection from dermatitis and skin infection.

In attendance: A. L. Feldman, President; Ted V. Fischer, Sales Manager; Ed P. Collins, L. G. Martin, H. M. Boniske, F. E. Baldwin, Charlie E. Braun, J. Richard Strasser, Phil S. Hirsh, Representatives.

Sarco Company, Inc.

Empire State Building, New York 1, N. Y.
Booth Nos. 403 and 404

Sarco will exhibit their line of steam traps, temperature regulators, strainers and space heating specialties with special emphasis on draining and air vent systems for dry cans and similar textile equipment. Also on display will be temperature regulators designed especially for the dyeing and finishing departments of the textile industry.

In attendance: Albert Milnes, Manager,

Industrial Division; Royster H. Johnson, Jr., Charlotte; others.

Seydel-Wooley & Company

748 Rice Street, N. W., Atlanta, Georgia

Booth Nos. 230 and 231

One of the company's standard Niagara Twist-Setter yarn conditioning machines, complete with conveyer, will be on display. In addition they will feature a half-size miniature model with plastic sides so that observers may watch the actual operation of the bobbins going through the machine.

Samples of the company's line of finishing chemicals, introduced to the trade since the last show, along with samples of cloth from mills using Seydel-Wooley products in their finishing operations will also be on display.

In attendance: Vasser Wooley, President; Paul Seydel and John Seydel, Vice-Presidents; W. L. Whisnant, Sales Manager, North and South Carolina; E. A. Scott, A. W. LaGrone, and W. H. Cutts, Sales Representatives; Dave Meriweather, Sales Representative, Finishing Division.

Smith, Drum & Co.

432 W. Allegheny Ave.

Philadelphia 33, Pa.

Booth 141

Package and skein dyeing equipment will be featured. Also, there will be information on beam dyeing and extracting and drying equipment.

In attendance: Perry M. Parrott, Joseph M. Ballentine.

A. E. Staley Manufacturing Company

Decatur, Illinois

Booth No. 415

This company, primarily a starch manufacturer, will not exhibit any of its products in the booth. A large aerial photograph of the Staley plant mounted against the backdrop to the rear of the booth below a large shadow-box type sign will make up the display.

In attendance: Paul D. Doolen, Sales Manager; Ivan F. Wieland, Assistant Sales Manager; A. R. Fuller, Chief Textile Chemist; W. H. Randolph, Jr., Southeastern Sales Manager; W. N. Delaney, Assistant Southeastern Manager; H. A. Mitchell, Manager, Spartanburg (S. C.) Office; W. P. Hope, Georgia Representative; W. T. Osteen, South Carolina Representative; L. A. Dillon, North Carolina Representative.

Stein, Hall & Company, Inc.

285 Madison Avenue, New York, N. Y.

Booth Nos. 468-469

This display will consist of sizing (both straight starch and modified starch) products, finishing starch and resinous finishes for all types of goods (e.g., voiles through broadcloths up to denims), printing water-soluble binders for pigment printing and modified starch carriers for soluble type dyestuffs such as vats and Rapidogens.

In attendance: L. F. Costello, Manager, Textile Sales Department; F. W. Perry, Charlotte Branch Manager; D. E. Truax, Chief Chemist, Charlotte Laboratory; N. H. Nuttall, Assistant Technical Director; W. S. Gilbert and S. S. Hockridge, Charlotte Salesmen; E. D. Estes, Atlanta Branch Manager.

Synthane Corporation

Oaks, Pennsylvania

Booth Nos. 311-313

Synthane plans to display Laminated Plastic Products in the basic forms of sheets, rods and tubes, as well as parts fabricated from their materials to customer design and specification. A line of molded laminated and molded macerated products will likewise be shown.

Particular emphasis will be placed on the use of laminated plastics in the textile industry such as bobbins, pirns, redraw caps, rollers, hosiery examining and turning forms, drier poles, etc. The exhibit will stress the combination of properties of Synthane's materials and how they can best serve the textile industry. These properties include lightness in weight, favorable weight-strength ratio, density, dimensional stability, low moisture absorption, and corrosion resistance.

In attendance: J. K. Johnson, Philadelphia District Manager; E. E. Smith, Assistant Sales Manager, C. B. Moss, Southern District Manager; F. C. Nave and H. Widdop, Sales Managers.

Taylor Instrument Companies

95 Ames Street, Rochester 1, N. Y.

Booth Nos. 432-434

The following will be exhibited:

(a) A new, direct, continuous reading size viscosity recorder with chart 0 to 100 centipoise. It reportedly operates on size box, storage kettles or size loop.

(b) A dye kettle controller with an adjustable rate of rise hold time and hold temperature. There are no cams to cut.

(c) A control panel for package or beam dyeing.

(d) Automatic cotton slashing control system.

(e) Taylor Transaire Demonstration Unit. This will show the new temperature or pressure force-balance transmitter.

In attendance: H. G. Olson, Textile Sales Manager; J. Barber, Application Engineer; Howard Barker and Jack Barker, Atlanta Office; W. C. Howard, Knoxville Office; W. C. Gray, Greensboro Office; and H. M. Messenger, Charlotte Office.

Texize Chemicals, Inc.

Greenville, S. C.

Booth No. 416 Annex

This display will consist of sizing materials and plasticizers. A special feature of the exhibit will be the new type sizings in liquid form.

In attendance: W. J. Greer, W. N. Kline, Jr., W. M. Greer, J. B. Garrett, and C. M. Chalmers.

Truscon Laboratories

Caniff & G.T.R.R., Detroit 11, Mich.

Booth Nos. 308-310

Industrial maintenance paints and surface treatments for interiors and exteriors, floors, interior walls, ceilings and structural steel will be on exhibit. Special attention will be given to the history of Eye Comfort Color Harmony Systems for interiors, for improving seeing conditions contributing to better morale and workmanship. Special prominence will also be given Speed-Rex machinery finishes, exterior masonry coatings and steel sash painting and glazing systems.

In attendance: George S. Beckham, Atlanta Branch Manager; James E. Blue, Home Office Representative; and Ernest G. Vetter, Home Office Representative.

United States Testing Company

Hoboken, N. J.

Booth 483

Textile testing equipment will be featured with emphasis on cotton-fiber testing. A laboratory-model cotton-fiber blender will be shown.

In attendance: C. A. Baker, E. Donahue and S. C. Mayne.

(Concluded on Page 646)

STUDIES IN TEXTILE PRINTING: II. ANALYTICAL METHODS FOR DETERMINING THE VAT DYE CONTENTS OF TEXTILE PRINTS

C. R. WITSCHONKE and F. FORDEMWALT

Contribution of the Application Research Department, Calco Chemical Division, American Cyanamid Company

The need for a method by which the exact quantity of a vat dye applied to a fabric during the printing operation can be determined as well as the amount of dye which remains in the fabric after each of the various finishing operations such as aging, oxidizing, soaping, etc., has long been recognized. Two quantitative analytical procedures are presented for accomplishing this result. In the "Extraction Procedure" the dye is removed from the fabric with anhydrous pyridine and the dye strength of the resulting pyridine solution is measured spectrophotometrically. In the "Titration Procedure" the quantity of a printing paste applied to the fabric is determined by titrating potentiometrically for the total alkalinity of both the unaged print and the original printing paste. The "Extraction Procedure" may be applied at any stage in the printing process, but is, of course, limited to those dyes exhibiting sufficient solubility in pyridine. The "Titration Procedure" is limited to undeveloped prints but is independent of the dye or dye mixture used.

INTRODUCTION

IN the first paper (Part I) of this series* it was pointed out that reliable dye analyses are an essential part of any thorough study of the factors controlling the economics and quality of the textile printing process. Numerous references to quantitative methods of analysis for dyes of various types on fabrics may be found in the literature but only a very few are applicable to the printing process or to vat dyes. Selected vat dyes have been analyzed by a micro-halogen technique developed by Willard and Thompson*(1)* and the method has been improved for dye-fiber combinations by Jacoby*(2)*. Neale*(3)* suggested the use of orthochlorophenol or sulfuric acid for extracting and analyzing for vat dyes but did not report any experiments. Boulton and Morton*(4)* used an optical method of analyzing for oxidized vat dye dispersions after extracting the dye as a leuco. Specht*(5)* reported an interesting indirect method for determining the vat dye contents of unaged prints by analyzing for the sulfur in the sulfoxylate.

None of the foregoing procedures was considered sufficiently general in application, convenient and rapid, or sufficiently precise for use in a research study of the factors involved in the textile printing of vat dyes. For this reason new methods of analysis were investigated and the two complementary procedures which were developed are presented in this paper.

* AMERICAN DYESTUFF REPORTER, 39, 607, September 4, 1950.

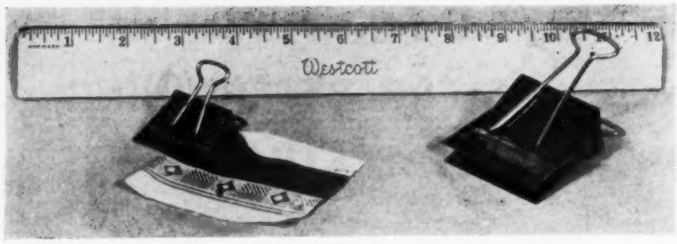
Simple Equipment, Used in a Hood, for Extracting Dye from Printed Samples

METHOD I—EXTRACTION PROCEDURE

In the Extraction Procedure of analyzing for the vat dye contents of prints the dye was extracted quantitatively from the fabric with anhydrous pyridine. The extraction was carried out with the dye in its oxidized (keto) state and the total dye content of the print was obtained by measuring the strength of the resulting pyridine solution spectrophotometrically. The Extraction Procedure has been successfully employed over a period of sev-

TABLE I
IDENTIFICATION OF VAT DYES ANALYZED BY THE EXTRACTION PROCEDURE

Dye	*Colour Index*
Blue 2B	1184
Navy Blue G	1100
Jade Green	1101
Golden Orange G	1096
Orange R	1217
Pink FF	P109
Violet 6R	1212
Fast Yellow	—



Templates Used for Sampling Printed Fabrics

eral years in routine analyses of cellulosic prints of such vat dyes as are listed in Table I. The Extraction Procedure has also been used for soluble (leuco ester) vat prints, vat pigment prints, vat dyed cellophane, cotton, rayon and wool, and vat pigment padding(7).

A. EXPERIMENTAL.—The following steps were involved in the Extraction Procedure.

1. A sample of accurately known area, usually 10 sq. cm. or 20 sq. cm., was cut from the printed area of the fabric to be analyzed.

2. In order to extract the dye from the samples rapidly and quantitatively, the following conditioning treatments were found to be advantageous.

(a) For finished (soaped) vat or soluble vat prints the sample was wet with one ml. of water.

(b) For samples as printed, i.e., containing alkali, sulfoxylate or undeveloped soluble vat dye, the sample was treated with three ml. of water and one drop of 6N H_2SO_4 and heated for 15 minutes on a water bath. If the printing formula contained chromates, one drop of 10% water solution of sodium formaldehyde sulfoxylate was also added.

(c) All Blue 2B prints were acidified and three drops of 40% $Ca(CNS)_2$ were added as a swelling agent in addition to the conditioning procedures prescribed in (a) and (b).

In all cases a few drops of water were added, as necessary during the heating, to prevent the samples from drying out.

3. After conditioning, the sample was heated at the boil for 20-30 minutes with approximately 30 ml. of anhydrous pyridine. The pyridine solution of the extracted dye was carefully poured into a volumetric flask and a fresh amount of pyridine added to the sample and heated as before. This operation was repeated until all visible dye was removed from the fabric. Two or three additions of pyridine were nearly always sufficient to remove the dye quantitatively. The volumetric flask was filled to the mark at 60°C. with anhydrous pyridine and held at this temperature ±5°C.

4. The spectrophotometric transmission curve of the pyridine solution was run at the same temperature as that at which the dilution to volume was carried out (60°C. ±5°C.). The concentration of the pyridine solution was then obtained by reference to a standard transmission curve for the dye involved. From the concentration and volume of the solution, and the area of the print sample taken, the amount of dye present in each 100 sq. cm. of printed fabric was calculated.

The wavelengths at which the strengths of the pyridine solutions of the various dyes were measured, along with the approximate solubilities of the various dyes in pyridine at 30°C., are listed in Table II. Those dyes having solubilities of 25 mg./liter or greater may be analyzed at 30°C. instead of 60°C. if so desired. Photometric strengths of pyridine solutions were measured either at the absorption maxima or at clearly defined isosbestic points.

DISCUSSION OF THE EXTRACTION PROCEDURE. — Two major problems arose during the development of the Extraction Procedure. The first problem was the difficulty in removing the dye from the fabric quantitatively in a practical length of time. This was especially difficult for finished rayon prints. Apparently, an initial swelling of the fabric was necessary before the last traces of the dye would extract. The swelling was accomplished by moistening the prints with water before adding the pyridine and, in extreme cases, by adding a small quantity of calcium thiocyanate, a well-known swelling agent, to the water.

The second problem was to eliminate any analytical errors introduced by the chemicals present in the unaged prints, e. g. due to decomposition of the dye, reduction of the solubility of the dye in the pyridine or coloring of the pyridine by materials other than the dye. The various conditioning operations recommended for the Extraction Procedure resulted from a detailed quantitative study of each dye in the presence of the chemicals normally used in printing applications.

The following chemicals were considered in addition to the commonly used printing carriers:

1. Vat Formulations: Free alkali, alkali carbonates, glycerine and sodium formaldehyde sulfoxylate.
2. Soluble Vat Formulations: Ammonium thiocyanate, sodium chlorate, ammonium vanadate, sodium chromate, sodium dichromate, sodium nitrite, ammonium chloride, diethylene glycol, dimethyl sulfanilate, urea, acetamide and furfuryl alcohol.

Only the following chemicals were found to affect the accuracy of the dye analyses seriously:

1. Excess alkali (only with Blue 2B)
2. Sodium formaldehyde sulfoxylate
3. Sodium chromate or dichromate

The addition of a small amount of acid to the wet print prior to extraction with pyridine, served to neutralize the effect of the alkali in vat dye formulations and speeded the hydrolysis and oxidation of the dye in soluble vat formulations. The addition of acid in combination with heat effectively removed interference due to the sulfoxylate. Sodium chromate and dichromate were found to be appreciably soluble in pyridine, imparting a strong yellow color to the solution. Heating in the presence of sulfoxylate and acid apparently reduced the chromium to a pyridine-insoluble valence state and then decomposed any sulfoxylate remaining.

B. RELIABILITY OF THE EXTRACTION PROCEDURE FOR FINISHED PRINTS.—The reproducibility of analyses for the dye contents of adjacent samples of the same print stripe was excellent, being of the order of ±2%. The accuracy of the Extraction Procedure could not be

TABLE II
PHOTOMETRIC AND SOLUBILITY DATA FOR THE EXTRACTION PROCEDURE

	Wavelengths at Which Photometric Strengths Were Measured (Mμ)	*Solubility of Oxidized Dye in Pyridine at 30°C. (Mg. Real Dye per Liter)*
Blue 2B	616	25
Navy Blue G	583	900
Jade Green	657	20
Golden Orange G	473	2
Orange R	480	25
Pink FF	493	15
Violet 6R	560	10
Fast Yellow	437	60

TABLE III

COMPARISON OF THE EXTRACTION PROCEDURE FOR DEVELOPED VAT PRINTS WITH MICRO-HALOGEN ANALYSIS

Dye Used	% Halogen in Pure Dye	% Halogen in Printed Fabric	% Halogen in Blank Print	% Dye in Print by Micro-Halogen Analysis	% Dye in Print by Extraction Analysis	% Diff.
Pink FF	18.2	0.16	0.01	0.83	0.91	+9
Blue 2B	54.6	1.21	0.06	2.10	2.01	—4

TABLE IV

ACCURACY OF THE EXTRACTION PROCEDURE FOR VAT DYED COTTON

Dye Used	Dye Content of Dyeing (Mg. Real Dye/g. of Cloth) By Exhaustion in Dyeometer	By Extraction Procedure	% Diff.
Jade Green	3.39	3.40	+0.3
Jade Green	7.45	7.50	+0.7

determined directly due to the lack of any sufficiently reliable method with which it could be compared. An approximate comparison was made by application of the micro-halogen technique of Willard and Thompson (*1*) to developed prints of two vat dyes which contain considerable halogen, namely Blue 2B and Pink FF. For each experiment two printing pastes were prepared which were identical in every respect, with the exception that one contained no dye, and prints were struck off side by side on cotton. The colored and uncolored prints were developed together and then both were analyzed for total halogen by combustion in a Parr bomb. The dye content of the colored print was also determined by the Extraction Procedure. The analytical results are summarized in Table III.

As can be seen from Table III the agreement between the two methods was quite good when it is considered that the accuracy of the halogen determination was probably no better than ±0.02 weight percent halogen.

An indirect check on the absolute accuracy of the Extraction Procedure was obtained by extracting the dye from two carefully dried pieces of dyed cotton cloth which contained known amounts of Vat Jade Green. The dyeings were prepared in the Dyeometer (*6*), the dye content being calculated from exhaustion data on the leuco. The results are presented in Table IV.

The agreement between the two sets of data in Table IV is excellent, being even better than the reproducibility for print analyses. This is probably due to the greater accuracy of sampling by weight rather than by area.

C. RELIABILITY OF THE EXTRACTION PROCEDURE FOR UNAGED PRINTS.—In order to check the accuracy of the Extraction Procedure for unaged prints a "Manual Print" method was employed. Separate printing color pastes containing accurately known amounts of each of the vat dyes were prepared in the normal manner. Portions of these pastes were then applied to separate weighed, double-thickness pieces of 80 x 80 cotton cloth with a spatula. The cloth was immediately reweighed to obtain the exact weight of paste deposited. After these "Manual Prints" were dried, the dye content was determined by the prescribed Extraction Procedure. Representative analytical results for each dye using this technique are presented in Table V. Generally, the accuracy of the Extraction Procedure was as good as the accuracy with which the dye contents of the original printing pastes could be determined.

TABLE V

ACCURACY OF THE EXTRACTION PROCEDURE FOR UNAGED VAT AND SOLUBLE VAT PRINTS

Dye Used	Mg. Real Dye Applied to the Fabric	Mg. Real Dye Found by Extraction	Percent Difference
Vat Dyes			
Blue 2B	3.24	3.12	—4
Navy Blue G	1.55	1.52	—2
Jade Green	1.25	1.25	0
Golden Orange G	1.18	1.18	0
Orange R	1.33	1.32	—1
Pink FF	1.09	1.10	+1
Violet 6R	2.33	2.28	—2
Fast Yellow	1.37	1.33	—3
Soluble Vat Dyes			
Blue 2B	1.79	1.73	—3
Orange R	2.06	2.06	0
Pink FF	1.60	1.72	+6
Violet 6R	2.08	2.10	+1

METHOD II—TITRATION PROCEDURE FOR VAT DYE ANALYSIS

In some cases it has been sufficient to determine the amount of a vat dye deposited at the machine without regard to the amount which became fixed in the fabric. A simple and rapid titration method has been found applicable to such situations. This method is indirect in that the total alkalinities of the printed sample and the printing color paste are the quantities which are measured. From these the weight of printing color paste deposited at the machine is determined. Knowing the dye content of the paste, the dye content of the print can then be calculated.

A. EXPERIMENTAL. — Four steps were involved in the titration procedure:

1. A weighed quantity of the printing color paste was titrated potentiometrically with 0.01 N HCl to a pH of 4.5.
2. A sample containing a known printed area was cut from the dried unaged print.
3. The print sample was also titrated potentiometrically for total alkalinity in approximately 100 ml. water.
4. From the total alkalinity of the printing color paste and of the printed fabric sample the amount of paste deposited on the fabric was calculated. Knowing the dye content of the original printing color paste, the dye content of the print was readily determined.

B. DISCUSSION OF THE TITRATION PROCEDURE. — Vat printing pastes normally contain some free alkali or bicarbonate and considerable alkali carbonate. By titration to a pH of 7.0 with a strong acid such as HCl, the following reactions are completed. M is an alkali metal.

$$MOH + HCl \longrightarrow MCl + H_2O$$
$$M_2CO_3 + HCl \longrightarrow MCl + MHCO_3$$

If more acid is then added until a pH of approximately 4.5 is reached, all the bicarbonate is titrated:

$$MHCO_3 + HCl \longrightarrow MCl + H_2O + CO_2$$

Any CO_2 absorbed from the air by the

alkaline printing paste or by the undeveloped print prior to the titration enters into one or both of the following reactions:

$$M_2CO_3 + CO_2 + H_2O \longrightarrow 2MHCO_3$$
$$MOH + CO_2 \longrightarrow MHCO_3$$

Since the titration is carried out so that all the bicarbonate is neutralized, the total equivalents of titrated alkali in the system remain unchanged by the absorption of CO_2. In other words, the analytical results are independent of the quantity of CO_2 absorbed from the air. Of course, other acidic vapors could introduce errors.

When the weight of a vat printing color paste or a vat dye deposited on the fabric at the print machine is the only factor of interest, the advantages of simplicity, speed and economy of the Titration Procedure are at once apparent.

C. RELIABILITY OF THE TITRATION PROCEDURE. — The reproducibility of the Titration Procedure on successive portions of the same print stripe was found to be approximately ± 1%. In order to test the reproducibility of titrations for the total alkalinity of pastes and of vat prints on standing, Vat Jade Green prints were prepared on cotton and dried. Both the printing color paste and samples of the printed fabric were titrated potentiometrically. Samples of both were again titrated at the end of 20 days and at the end of 32 days. During this time the paste was kept in a tightly stoppered bottle to prevent evaporation of water and the print was left exposed to the atmosphere. The results are presented in Table VI. In each case the amount of total alkali originally present was designated at 100 for easy comparison.

TABLE VI
REPRODUCIBILITY OF THE TITRATION PROCEDURE

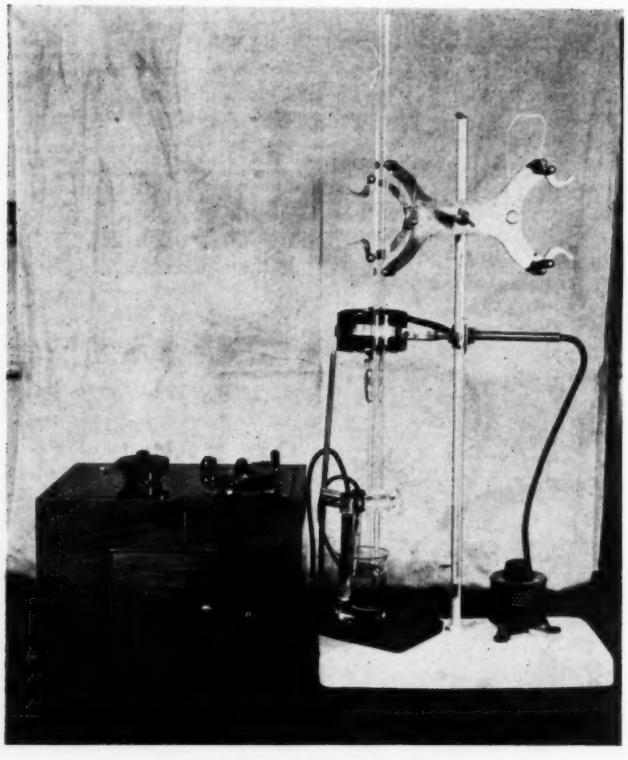
Time Since Prints Were Struck (Days)	*Total Alkalinity of the*	
	Printing Paste	*Unaged Print*
0	(100)	(100)
20	97	98
32	97	98

TABLE VII
COMPARISON OF THE ANALYTICAL PROCEDURES FOR UNAGED VAT PRINTS

Dyes Used in Printing Paste	*Dye Contents of the Undeveloped Prints (mg. Dye/100 sq. cm.)*		
	By Extraction Procedure	*By Titration Procedure*	*% Dif.*
Blue 2B	14.6	13.9	—5
Navy Blue G	14.0	13.6	—3
Jade Green	11.3	11.2	—1
Orange R	9.9	9.4	—5
Violet 6R	18.0	18.6	+3
Fast Yellow	12.2	11.7	—4

TABLE VIII
MILL TRIAL COMPARING STARCH AND CMC CARRIERS

	Wt. of Printing Paste Used Up (Pounds)	*Yards of Pattern Printed*	*Yards Printed Per Pound of Printing Paste*	*Yards Printed Per Pound of Color*	*Relative Dye Analysis of Printed Fabric*
15% Color Paste in Starch Carrier	13.5	280	20.8	138	100
30% Color Paste in CMC Carrier	11.5	490	42.5	142	110



Apparatus Used for Titration Procedure

The 2% to 3% initial decrease in alkalinity observed in Table VI was probably due to a slight amount of acid liberated by the decomposition of the sulfoxylate. A 3% decrease in alkalinity was noted when a fresh print was steam aged for a few minutes. No other variation in total alkalinity was found in spite of the fact that the print was free to absorb CO_2 from the air.

The accuracy of the Titration Procedure was checked further by comparison with the Extraction Procedure. Prints of the various dyes were prepared on cotton cloth using printing color pastes of known dye content. Adjacent samples of the undeveloped prints were analyzed by both procedures. The analytical results, presented in Table VII, show that the agreement between the two procedures was quite satisfactory.

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HISTORICAL BACKGROUND OF ABRASION TESTING

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This is the first in a series of reports on methodology studies relating to the testing of textile fabrics for resistance to abrasion, from the laboratories of the Ellen H. Richards Institute, sponsored by the American Viscose Corporation.

As an introduction to a series of investigations having as their objectives: (a) the standardization of a test for abrasion of wearing apparel fabrics using a type of equipment readily available on the market and used in many laboratories, and (b) the establishment of a standard abrasion treatment as a part of an accelerated aging test for fabrics, the literature covering textile abrasion testing was reviewed. The following is a brief resume of the more important findings of previous investigators working in this field.

The fundamental question: *To what extent should the laboratory wear test approximate service during wear* is still not answered and proponents of two philosophies are noted in the research literature of this field, as hereinafter reviewed.

In the year 1934, the late H. DeWitt Smith, then of the A. M. Tenney Associates, expressed the philosophy held by many in the textile field by stating the following at a U. S. Institute of Textile Research Conference *(27)*:

> "I should like to see fabrics classified as to use, the most important classes in which wearability is a factor grouped, the causes of wear determined, machines designed to duplicate service results, and properties which affect wearability determined."

The duplication of service wear, however, has been complicated by the fact that the essential factors in service life are not known to an exact degree. Skinkle *(22)* has explained that service life depends on such personal factors as size, weight, and occupation of the wearer of a fabric, on the climate around him and on the extent to which it may make him perspire, on the fit of the garment, and on the laundry methods used, together with the infinite variety of mechanical details involved in the motion of a fabric while being worn—all at low standard rates—mostly slower than abrasion laboratory tests.

Recognition of these difficulties induced Pierce *(15)* to denounce imitative tests as *a delusion and a snare* and to add:

> "Tests should be devised to measure characteristics, defined by behavior under the simplest conditions. Their validity depends not on imitative features in the testing procedure, but on intelligent interpretation, based on empirical correlation with service experience."

Ball *(2)* has suggested that the wear testing machine should be planned to reproduce those influences which account for the major part of the destructive effort; and Lomax *(9)* further has suggested that it is not required that service life be forecast in some unit of time, but rather that the problem should be one of comparing one fabric with another. This reduces the requirements of the apparatus and the selected procedure need not, then, duplicate the actual conditions of use, but only rank fabrics in order of merit. Kaswell *(8)*, in his work on three combat course fabrics in connection with the Quartermaster Depot, agrees with this latter philosophy when he makes the statement that a laboratory test need not duplicate an actual set of service conditions if wear produced by the abrasion machine can be correlated with service wear in such a way as to predict the abrasive resistance of a fabric.

It is noted that, early in the history of wear testing, two terms—*abrasion and wear* have been used interchangeably. Recent reporters such as Hamburger and Lee *(6)*, as well as Skinkle *(22)*, however, have made a distinction between these two terms. They define abrasion as the type of destruction resulting from frictional forces on fabrics; and they refer to rubbing away of the fabric by attrition, which may occur as a result of friction of cloth on cloth, cloth on external objects, and friction of fibers on the dust or grit in the fabric. They differentiate its meaning from the term wear, which is a more inclusive term and which, as explained by Skinkle *(22)*, is the amount of deterioration of a fabric which results from breaking, cutting, or removal of fibers.

Skinkle adds that wear may be caused by direct forces, impacts, and flexing or bending applied to the fabric, with consequent friction of fiber on fiber and yarn on yarn, as well as the factors in what have been above designated as abrasion. Stoll *(23)* goes even further and suggests that, numerically, the mechanical factors involved in normal wear can be assumed approximately as "30 per cent plane abrasion, 20 per cent edge and protection abrasion, 20 per cent tear, and 10 per cent other mechanical action." He cites results obtained from selvage analysis on various types of field uniforms conducted by the Army Quartermaster as the primary basis for these conclusions, but cautions that the order of relative importance of these factors is directly related to certain inherent fiber properties.

Abrasion has been cited by Mann *(10)* and by Tait *(24)* as the most important single factor in wear. For this reason, many textile technologists have simplified the problem by studying the resistance of fabrics to abrasion rather than to wear in general.

The two philosophies—the one of duplicating actual conditions of wear and the other of selecting the most important causes of wear and correlating them with service tests—have led to the development of more than 50 abrasion and wear-testing machines. These are listed, described, and explained by Dawson *(3)*; the principles of each have depended upon the philosophy of the person or persons developing the equipment. To Dawson's list should be added the instrument described by Dean *(4)* of the Shirley Institute, the Improved Single Unit Schiefer Abrasion Testing Machine *(19)*, and the Stoll machine *(23)*, as well as the list of German wear-testing instruments published in January 1948 by Schiefer, Fourt, and Kropf *(20)*.

Many machines designed for abrasion testing have been discarded after having been studied, many of them with insuf-

ficient thoroughness to determine their worth. Of this enormous list, Tanenhaus and Winston *(25)* have determined by letter ballot that three are in most common use today. These three machines were found to be the Taber Abraser, the Abrader of the U. S. Testing Company, and the Wyzenbeek Precision Wear Test Meter. While not in as broad a distribution, but of notable mention in connection with precision abrasion tests are the two machines noted above; namely, the Schiefer Abrasion Testing Machine, and the more recent Multipurpose Abrasion Tester *(23)* developed by Stoll and others under the research program of the Quartermaster Corps. Results from tests made with the Schiefer machine, using a constant abradant, indicate that multi-directional uniform abrasion is attainable over the surface of the fabric. It is claimed that the Stoll Abrasion Tester gives a quantitative measure of the resistance of a fabric to flat, edge, and flex abrasion, and that the abrasion patterns duplicate in their essential features, those obtained under service conditions *(23)*.

Investigations in the field of abrasion have been carried out essentially along two lines:

(1) The relationship of fabric construction to resistance to dry and more recently to wet abrasion have been studied; and

(2) Attempts have been made to evaluate the results of abrasion testing on the various machines to ascertain (a) whether or not their results may be correlated with one another; (b) whether or not they reproduce service tests; and (c) whether or not they may be correlated with service tests.

In the first line of investigation, notable work has been done by Tait *(24)* in his study of 1100 lining fabrics, to determine the fiber and fabric characteristics which gave the greatest abrasive resistance. Schiefer and Cleveland *(18)* have reported their study on the abrasive resistance of rugs in relation to construction; and Hays *(7)* has related her findings on the relationship of different weights and weaves of 26 work clothing fabrics to their abrasion resistance. The influence of closeness of weave and yarn twist on resistance to wear by rubbing were investigated by Morton and Turner *(14)* as well as by Matthews *(11)*. Other than the studies carried out during the recent war by German technologists and reported by Schiefer and others *(20)*, little has been accomplished toward determining the relationship of intrinsic fiber properties to abrasive resistance, although Hamburger and Lee *(6)* have attempted to explain the difference in effect of abrasion on two acetate and viscose lining fabrics. More recent work by Hamburger *(12)* has been directed toward investigating yarn structure as related to abrasion resistance. In this connection, the factors reported as being significant were the following: pressure on the yarn, area of the yarn, yarn twist, and removal of permanent set. Fletcher, Boyer, and Floersch *(5)* have compared the relative wearing quality of wool, rayon, and wool-rayon blended fabrics; and A. Rosenzweig *(16)* has experimented with the relative durability of rayon, silk, wool, linen, and cotton, when subjected to rubbing tests. A recent investigation by Schiefer and Krasny *(21)* on wet and dry abrasion of wool fabrics has indicated that a considerable increase in the rate of abrasion takes place when three specimens are abraded successively with the same abradant. The cause for this increasing rate of attrition has been attributed to the small globular particles, assumed to be the elemental structural molecule of the wool fiber, which are formed when mechanical disintegration of the fiber takes place. Gagliardi *(13)* has studied the abrasion resistance of fibers and fabrics manufactured from various types of resin modified cellulose, and Stoll *(13)* has recently reported work conducted on various broadcloths using the Stoll machine, which is capable of producing flex, flat, and edge abrasion. Although each type of abrasive action produced by this instrument ranked the experimental fabrics in a different order, the wet flex tests gave the highest degree fo consistency.

As noted previously, German technicians devoted much time during the war years to abrasive tests which would evaluate certain properties of fibers, yarns, and fabrics. The ultimate objective of this tedious and exhaustive work was the combination of these measured values into a single wear index. This index not only would be indicative of service performance, but in addition would offer means for evaluating fiber and yarn constructions, leading to the selection of the best composition and construction to give maximum serviceability.

In general, efforts made to correlate the results of different machines as well as those made to obtain similar inter-laboratory evaluations of the same instrument have not been highly successful. An examination of the results from a study of the Wyzenbeek machine conducted jointly by the Quartermaster Corps and the American Society for Testing Materials, and reported by Tanenhaus and Winston *(26)* revealed such wide variations in the abrasive action among the individual units as to prevent the use of this instrument as a basis for establishing inter-laboratory standards. Hays *(7)* found no correlation between results from the Taber and Wyzenbeek machines; and workers in the Fabric Development Laboratory of the American Viscose Company have found no correlation between the machine of the U. S. Testing Company, the Taber Abraser, and the Wyzenbeek Precision Wear Test Meter.

A review of the reported studies on the calibration of abrasion machines currently available indicated that probably the most accurate statement that can be made in this connection is that the machines can be used within limitations for evaluating differences in abrasion resistance among materials, and for the ranking of these materials in the order of their resistance. Failure to find correlations between the results obtained with different machines may be due to lack of standardized test procedures with different machines, as well as to the fact that each machine may measure different properties. Kaswell *(8)* explains that the Taber and the Massachusetts Institute of Technology models rank each set of abrasion and test directions in the same order when rated visually, but that it is not possible to state from loss in strength curves that X cycles on the Massachusetts Institute of Technology model and Y cycles on the Taber are equivalent.

Again Dawson *(3)*, Ball *(2)*, and Skinkle *(22)*, separately have presented reviews of the literature with regard to the methods used for evaluating the results of abrasion tests. Listed briefly, these results include:

I. Visual Changes:
   a. Loss of luster;
   b. Changes of surface;
   c. Color changes;
   d. Appearance of first broken yarn;
   e. Appearance of three broken yarns; and
   f. Appearance of a hole.
II. Thickness Changes;
III. Air Permeability Changes;
IV. Weight Changes; and
V. Strength Changes.

Perhaps the method of expressing changes in textile fabrics due to abrasion used most extensively is that of determining the number of rubs required to produce a certain visual change as determined by means of the unaided eye, or with the help of magnification, sometimes by comparison with established standards. Russman's *(17)* work on men and women's suit and coat materials has received wide recognition. In this investigation, *master samples* taken from worn garments were used to determine a season's wear on each fabric. In addition, these investigators attempted a correlation with rubs of the test apparatus, in order to compare the number of single rubs on the Wyzenbeek equipment needed to produce a rupture with a *one month's wear* factor for that particular type of goods, in order to predict how many months a suit should last under so-called normal use. Arbitrary values were set for poor, fair, and

good results.

Tait *(24)* used the visual end-point in his study of lining fabrics, and set up a photographic standard to be used as the end-point.

Stoll *(23)* cautions that in the evaluation of wear results, distinction should be made between *macra-* and *micro*-wear patterns. The former is defined as the type of pattern usually recognized in abrasion tests and which generally can be classified as holes and wear areas. The *micro* pattern is described as the type which indicates mechanical disintegration of the fiber caused by the interaction of the cohesive forces listed by Stoll as "cohesion between the abrasive and the fiber, cohesion between contiguous fibers, and cohesion between the structural parts of the fibers themselves." Schiefer and Krasny *(21)* recently have contributed to these studies of micro-wear patterns and related fragment size, as previously mentioned in this report, by investigating the debris from wet and dry abrasion of wool fabrics micro-chemically, using the Schiefer machine.

Most of the commercial laboratory tests are based on some visual end-point as determined by each laboratory. It is felt by some writers, however, that the personal variation factor in this procedure is too great to be reliable. For those who hold this point of view, various numerical values have been used. The factor in greatest use in this connection is strength loss. Hays *(7)* experimented with a half-grab strength strip for this purpose, while Hamburger and Lee *(6)* have suggested carrying out the strength test at right angles to the direction of rubbing.

An outstanding work on the evaluation of abrasion results has been that reported by Kaswell *(8)* in his study of three fabrics subjected to accelerated wear on an Army combat course. This work sponsored by the Quartermaster Corps is continuing, and recent reports by Tanenhaus *(13)* reveal the fact that, on the basis of a preliminary analysis of recent date, good correlation exists between the accelerated Combat Course results and the results of s-called normal wearability test. In the original work of Kaswell, a curve of the percentage loss in strength versus the number of rubs to increasing cycle stations was plotted for four abrasion and test directions. Mathematical formulas have been used for correlating these results with findings from service tests carried out on the Combat Course. This is in line with the reasoning of Pierce *(15)*, who has commented that the end-point at which a material must be discarded is not the only measure of serviceability. The quality of the new cloth is of interest as is the duration of its useful life, and its quality during its period of serviceability. Hamburger and Lee *(6)* state the following concerning strength tests:

> "This selection of an end-point is undesirable in that it precludes a study of the rate at which the sample is proceeding to destruction, coupled with the fact that the end-point is impossible to define and reproduce. Per cent loss in unabraded ultimate strength versus abrasion cycles depict both *durability* which connotes time to reach a given degree of destruction expressed in abrasion cycles, and rate of destruction which connotes the path of the per cent loss versus cycle curve."

A contribution has been made in recent months to this problem of measuring quantitatively the amount of abrasion resulting from tests by Schiefer, Krean, and Krasny *(19)*, who developed a capacitance method for measuring abrasion quantities. The method is based upon the change occurring in the electrical capacitance of the abraded samples as a result of abrasive action. A percentage value for the degree of destruction is derived from a mathematical treatment of the difference in capacitance of the original specimen and the capacitance after a specified number of abrasion cycles, with corrections made for deviations resulting from the influence of the air. These percentage values are projected onto a diagram of the test specimen—resulting in the formation of an iso-ruin map of the test area. It has been suggested that a comparison of these maps made at successive wear intervals offers a method of evaluating fabric attrition caused by abrasion. It is reported further that the method seems to meet the requirements for an efficient quantitative measuring technique; namely, "that it not disturb nor affect the specimen, and that it be simple, rapid, and sufficiently sensitive".

Although many laboratories currently use abrasion tests to aid in the determination of fabric quality, and much research is in progress in the field of abrasion testing, there is no standardized procedure in general use. Lack of a generally accepted standard procedure becomes evident from visits to research laboratories, scrutiny of the minutes of the recent meetings of the Task Group on Abrasion Testing of the American Society for Testing Materials, and private conversations with persons in the fore-front of the fabric testing field. The need for standardization of abrasion test procedures becomes more accentuated as an increasingly large number of new fibers, fabrics, finishes, and allied textile products appear on the market.

ACKNOWLEDGMENTS

The author is indebted to the Ellen H. Richards Institute and to the American Viscose Corporation for the opportunity of being associated with the research studies on accelerated aging tests for rayon being conducted under their joint auspices. The author further is deeply grateful to George S. Wham, Jr., for invaluable assistance in the preparation of this literature review.

BIBLIOGRAPHY

1. American Viscose Corporation—Fabric Development Laboratory, Report Number 999 on Utility Garments (1943).
2. Ball, Herbert J., "Problems Which Abrasion and Wear Testing Present." *Textile Research J.* 8:134 (1938).
3. Dawson, T. R. "Abrasion and Wear Testing of Textile Fabrics." *J. Rubber Research*, 15:65 (1946).
4. Dean, Raymond F. "Recent Advances in Abrasion Testing of Textiles." *J. Textile Inst.*, 37:380 (1946).
5. Fletcher, H.; Boyer, M.C. and Floersch, M.C. "Serviceability Comparisons." *Am. Dyestuff Reptr.*, 30:491 (1941).
6. Hamburger, W. J. and Lee, H. N. "A Study of Lining Fabric Abrasion" *Rayon Textile Monthly*, 26:61, 93 (1945).
7. Hays, M. B. "Physical Properties of 26 Work Garments Fabrics" *Rayon Textile Monthly*, 25:72 (1944).
8. Kaswell, Ernest R. "Wear Resistance of Apparel Textiles, Parts I and II." *Textile Research J.*, 16:413, 502 (1946).
9. Lomax, J. "The Serviceability of Fabrics in Regard to Wear," *J. Textile Inst.*, 28:218 (1937).
10. Mann, J. C. "The Serviceability of Fabrics in Regard to Wear." *J. Textile Inst.*, 28:220 (1937).
11. Matthews, J. A. "*A Comparison of Some* Fabric Test Methods." *J. Textile Inst.*, 22:T497 (1931).
12. Minutes of the Task Group on Abrasion Testing, Committee D-13, Sub-Committee B-1, American Society for Testing Materials, October 14, 1948.
13. Minutes of the Task Group on Abrasion Testing, Committee D-13, Sub-Committee B-1, American Society for Testing Materials, October 21, 1949.
14. Morton, W. E. and Turner, A. J. "The Influence of the Degree of Twist in Yarns on the Results of Yarn Mercerization, and on the Properties of Plain Fabrics Made From Grey or Mercerized Cotton Yarns." *J. Textile Inst.*, 19:T189 (1928).
15. Pierce, F. T. "Testing Fabrics to Foretell Serviceability." *J. Textile Inst.*, 28:181 (1937).
16. Rosenzweig, A. "Relative Durability of Textile Fabrics." *Textile Mfr.*, 58:212 (1932).
17. Russman, A. "Correlation Between Laboratory Abrasion Tests and Service Life of Men's and Women's Outerwear." A.S.T.M. Annual, p. 349 (October, 1941).

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CONTROL OF THE DYEBATH BY MEANS OF SPECTROPHOTOMETRIC MEASUREMENTS

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CORRECTION of the dyebath to a standard concentration of components is a problem which often confronts dyers. The required correction can be determined from a few simple measurements on the spectrophotometer and calculations. It is the purpose of this paper to describe this method in detail in order that owners of recording or nonrecording spectrophotometers, who are not acquainted with this method, might try it out in practice. This method, it should be noted, is not new. The theoretical basis for it may be found in any textbook on spectrophotometry.[1] Also, several dyers have used it for a number of years. However, there appears to be no published article to which a dyer can turn for a detailed description of this method.

The problem with which this paper is concerned is not the general one of color matching. In other words, the method to be described does not permit one to calculate the amount of several dyes which must be placed in a dye bath in order that the dyeing produced will match an arbitrarily selected sample. The method assumes that a suitable match with the sample has been made and that the correct composition of the dyebath to produce that match is known. By means of the measurements and calculations to be described, then, one may calculate what corrections are needed to the bath if its composition varies from the standard.

The theoretical basis of the method to be described is Beer's Law and the additivity of density. These two laws may be stated as follows:

$$D = kCl \qquad (1)$$

where D is the measured optical density at a specific wavelength of a solution of a given dyestuff at concentration C, k is a constant, and l is the length of the optical path used for measurement through the solution. This equation will be true for any concentration as long as there is no interference of one dye molecule with another. Also,

$$D = D_1 + D_2 + D_3 + \ldots \qquad (2)$$

where D is the measured density of a mixture of several different dyes, and D_1, D_2, D_3, etc. are the measured densities of the components at the concentration they have in the mixture. Both of the laws expressed in equation 1 and 2 are derivable from the assumption that a dye molecule absorbs a constant fraction of the light incident on it.

To illustrate the theory of this method of controlling the dyebath, consider a dyebath composed of three dyes, a red, a yellow, and a blue. Let

R = concentration of red dye (grams/liter) in mixture

Y = concentration of yellow dye (grams/liter) in mixture

B = concentration of blue dye (grams/liter) in mixture

the density of the red dye measured at wavelength λ_1, is given by the equation

$$D_R\lambda_1 = k_R\lambda_1 Rl \qquad (3)$$

because of the relation expressed in equation 1. The densities of the red dye at λ_2, λ_3, and so on will be given by similar equations, each with a different coefficient k. Likewise, similar equations can be written for the yellow and blue dyes. By use of equation 2 we may now write

$$\begin{aligned} D\lambda_1 &= D_R\lambda_1 + D_Y\lambda_1 + D_B\lambda_1 \\ D\lambda_2 &= D_R\lambda_2 + D_Y\lambda_2 + D_B\lambda_2 \\ D\lambda_3 &= D_R\lambda_3 + D_Y\lambda_3 + D_B\lambda_3 \end{aligned} \qquad (4)$$

where $D\lambda_1$, $D\lambda_2$, and D_{Y3} are the densities of the mixture measured at λ_1, λ_2, and λ_3. By substitution of the values of density from equation 3 we have

$$\begin{aligned} D\lambda_1 &= (k_R\lambda_1 R + k_Y\lambda_1 Y + k_B\lambda_1 B)l \\ D\lambda_2 &= (k_R\lambda_2 R + k_Y\lambda_2 Y + k_B\lambda_2 B)l \\ D\lambda_3 &= k_R\lambda_3 R + k_Y\lambda_3 Y + k_B\lambda_3 B)l \end{aligned} \qquad (5)$$

The l's have been factored out, assuming that all measurements are made in cells of identical thickness so that all l's for equation 3 are identical.

The D's are measured values, the k's and l's are all constants and R, Y and B are the unknown concentrations of the three dye components in the bath. By measuring the D's, then, we can, by means of equation 5, determine how much of each component is present in the mixture. Solution of equation 5 simultaneously for each measurement made would be slow and tedious; however, a simpler method can be employed. If we solve equation 5 (by means of determinants or any other

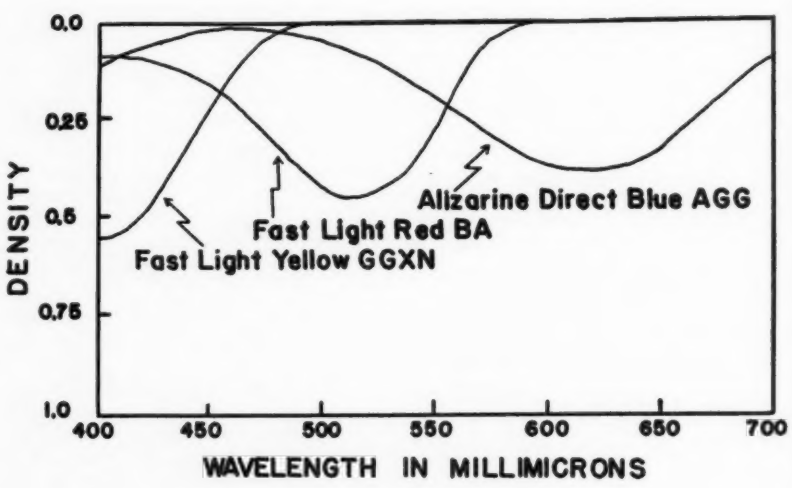

Figure 1

[1] "Analytical Absorption Spectrophotometry," M. G. Mellon Ed. Chapter 7. John Wiley & Sons, N. Y., 1950.

means) we obtain the following relations:

$$\begin{aligned} lR &= K_1D\lambda_1 + K_2D\lambda_2 + K_3D\lambda_3 \\ lY &= K_4D\lambda_1 + K_5D\lambda_2 + K_6D\lambda_3 \\ lB &= K_7D\lambda_1 + K_8D\lambda_2 + K_9D\lambda_3 \end{aligned} \quad (6)$$

where the K's have the following values:[2]

$$\begin{aligned} K_1 &= \frac{k_Y\lambda_2k_B\lambda_3 - k_B\lambda_2k_Y\lambda_3}{L} \\ K_2 &= \frac{k_B\lambda_1k_Y\lambda_3 - k_{Y\lambda_1}k_{B\lambda_3}}{L} \\ K_3 &= \frac{k_Y\lambda_1k_B\lambda_2 - k_B\lambda_1k_Y\lambda_2}{L} \\ K_4 &= \frac{k_B\lambda_2k_B\lambda_3 - k_B\lambda_2k_B\lambda_3}{L} \\ K_5 &= \frac{k_B\lambda_1k_B\lambda_3 - k_B\lambda_2k_B\lambda_1}{L} \\ K_6 &= \frac{k_B\lambda_1k_B\lambda_2 - k_B\lambda_1k_B\lambda_2}{L} \\ K_7 &= \frac{k_B\lambda_2k_Y\lambda_3 - k_Y\lambda_2k_B\lambda_3}{L} \\ K_8 &= \frac{k_Y\lambda_1k_B\lambda_3 - k_B\lambda_1k_Y\lambda_3}{L} \\ K_9 &= \frac{k_B\lambda_1k_Y\lambda_2 - k_Y\lambda_1k_B\lambda_2}{L} \end{aligned} \quad (7)$$

$$\begin{aligned} L = {} & k_B\lambda_1(k_Y\lambda_2k_B\lambda_3 - k_B\lambda_2k_Y\lambda_3) + \\ & k_Y\lambda_1(k_B\lambda_2k_B\lambda_3 - k_B\lambda_2k_B\lambda_3) + \\ & k_B\lambda_1(k_B\lambda_2k_Y\lambda_3 - k_{Y\lambda_2}k_{B\lambda_3}) \end{aligned}$$

Equations 6 and 7 are the ones which can most readily be used in control of the dyebath. The K's must be evaluated from equation 7 and placed in equation 6. By measurement of the density at three wavelengths, multiplication of these densities by the appropriate constants and addition of their products, one may determine the amount of each component present.

In order to illustrate the simplicity of this method, consider a dyebath made up of Fast Light Yellow GGXN, Fast Light Red BA and Alizarine Direct Blue AGG. Spectrophotometric curves of these three dyes in solution are given in Figure 1.

Note that the maximum absorptions occur at about 514 mu, 620 mu and 404 mu respectively. If we choose these three wavelengths for λ_1, λ_2, and λ_3 respectively, we will achieve sufficient accuracy in measuring the amount of each in solution by means of the method described above.

Table I contains the primary data needed for each of the dyes in order to calculate the k's from equation 3. The concentrations at which the dyes were measured were so chosen as to make the density at maximum absorption in a 1 cm. cell be about 1. This was done simply to keep the density values in the sensitive range of spectrophotometric measurement. The values of the k's calculated from equation 3 are given in the last column of the table. l, of course, equals 1 since measurements were made in a cell containing a 1 cm. path length through the solution.

The K's as calculated from equation 7 are as follows:

K_1 = —0.0002 grams/liter
K_2 = +0.0674
K_3 = —0.0157
K_4 = +0.0332
K_5 = —0.0069
K_6 = —0.0073
K_7 = 0.0000
K_8 = 0.0000
K_9 = +0.1146

It will be noted that K_1, K_7 and K_8 are practically zero, so the final equations for use in calculating concentrations become

$$\begin{aligned} R &= 0.0674\ D\lambda_2 - 0.0157\ D\lambda_3 \\ Y &= 0.0332\ D\lambda_1 - 0.0069\ D\lambda_2 - \\ &\quad 0.0073\ D\lambda_3 \\ B &= 0.1146\ D\lambda_3 \end{aligned}$$

These equations may now be used for any dyebath containing one, two or three of the dyes specified. *Once the previous calculations have been made, they need not be made again unless a dyebath containing dyes other than those specified is to be measured.*

Table II presents the results of an experiment to indicate the accuracy and precision of these equations. Sample solutions having the composition indicated were made up and measured by setting the wavelength dial of the recording spectrophotometer to the proper value and reading the density. Thus three measurements made in a 1 cm. cell, at λ_1, λ_2, and λ_3, are recorded for each sample. The concentrations of the three dyes as calculated from equations 8 are given in the last column. A comparison of the known concentrations and the calculated concentrations indicates the accuracy of the method.

In practice, the errors shown in Table II are less important than their size alone would indicate. Suppose, for example, that the composition of sample 1 is found to produce the desired shade on the cloth. The standard concentrations of red, yellow, and blue dye are then taken as the calculated values, 0.0148, 0.0087 and 0.0437 grams/liter. This means that the standard dye bath contains these calculated concentrations in a standard volume. When measurements are subsequently made, the volume of the bath should be kept constant in order to simplify the calculations. As an example, consider the standard volume to be 1000 liters.

Let us consider what corrections must be made if the density readings of sample 7 are obtained. The calculated concentrations indicate that the bath is off standard (i.e. differs from sample 1) by having too high a concentration of red and too low a concentration of yellow and blue. First we must draw off liquor and replace it with water to lower the concentration of red dye but still maintain the standard volume. The amount of liquor to be drawn off is

$$\frac{0.0159 - 0.0148}{0.0159} \times 1000 = 69 \text{ liters}$$

and, of course, 69 liters of liquid must be returned to the bath to maintain the standard volume. Drawing off 69 liters of dye liquor will lower the concentration of the yellow and blue as well as the red. The concentrations of yellow and blue remaining after drawing off the liquor and replacing it with water will be

$$\frac{1000 - 69}{1000} \times .0085 = .0079 \text{ g/l (yellow)}$$

$$\frac{1000 - 69}{1000} \times .0426 = .0396 \text{ g/l (blue)}$$

In order to raise the yellow and blue concentrations to the standard value, we must add

(.0087 — .0079) x 1000=0.8 gms (yellow)
(.0437 —.0396) x 1000=4.1 gms (red)

Note that in these calculations, the calculated rather than the actual concentrations of the standard bath are used. This can be done since we are interested only in correcting the bath if it goes off standard. In this manner, the corrections can be calculated more accurately than is indicated by the errors between actual and measured concentrations reported in Table II.

Although a three-component dye bath solution has been used here as an example, the same equations may be used for a two or a one-component dye bath. If

[2] If the values of K are written in the form of determinants, the expressions are much simpler. In any case, it should be borne in mind that these values of K's need be obtained only once for any set of component dyes.

TABLE I

Dye	Conc. (gms/liter)	$D\lambda_1$	$D\lambda_2$	$D\lambda_3$	k
Yellow	0.00175	0.527	0.002	0.001	$k_Y\lambda_1$ = 30.12 $k_Y\lambda_2$ = 0.11 $k_Y\lambda_3$ = 0.05
Red	0.003	0.092	0.445	0.001	$k_R\lambda_1$ = 3.07 $k_R\lambda_2$ = 14.83 $k_R\lambda_3$ = 0.03
Blue	0.0045	0.105	0.092	0.393	$k_B\lambda_1$ = 2.33 $k_B\lambda_2$ = 2.04 $k_B\lambda_3$ = 8.73

TABLE II

Sample	Actual Composition (grams/liter)		$D\lambda_1$	$D\lambda_2$	$D\lambda_3$	Calculated Composition (grams/liter)
1	Red	.0150	.409	.308	.381	.0148
	Yellow	.0088				.0087
	Blue	.0450				.0437
2	Red	.0300	.401	.486	.197	.0297
	Yellow	.0088				.0086
	Blue	.0225				.0226
3	Red	.0150	.606	.271	.197	.0152
	Yellow	.0175				.0168
	Blue	.0225				.0226
4	Red	.0172	.397	.336	.364	.0168
	Yellow	.0083				.0082
	Blue	.0429				.0417
5	Red	.0143	.438	.292	.363	.0140
	Yellow	.0100				.0099
	Blue	.0429				.0416
6	Red	.0143	.399	.302	.398	.0142
	Yellow	.0083				.0082
	Blue	.0472				.0456
7	Red	.0161	.403	.322	.372	.0159
	Yellow	.0085				.0085
	Blue	.0439				.0426
8	Red	.0146	.424	.302	.372	.0146
	Yellow	.0094				.0093
	Blue	.0439				.0426
9	Red	.0146	.405	.305	.387	.0146
	Yellow	.0085				.0085
	Blue	.0461				.0444

there is only one dye present, then equation 3 is sufficient to calculate the concentration, and a measurement of density at one wavelength is sufficient. In a two component system, one set of k's will be zero, and measurements of density at only two wavelengths will be required. The method can also be extended to more than three components but the equations then become more cumbersome.

In practice, several difficulties may be encountered in employing this method. Dye bath contamination, for example, might cause trouble. Lint from the cloth can gradually accumulate and cause errors in density measurements. Dirt will also cause erroneous calculations of dye concentration. Some difficulty will also be experienced in choice of wavelengths at which to measure and choice of the size cell in which to make the measurements. Wavelengths must be so chosen that measurable differences in density at those wavelengths occur when the concentrations of components are varied by the amount which it is desired to detect. In other words, wavelengths must be chosen so that the differences in densities between components are a maximum and in a measurable range. The path length, or cell size, must be chosen along with the amount by which the dyebath is to be diluted for measurement. In general, the cell and dilution factor must be so chosen that the measured density is no greater than about 1. All measurements, of course, should be made in identical cells and at identical dilutions of the dyebath. Usually it will be found most practical to measure the individual components at the same relative concentrations they will have in the dyebath, but this is not necessary.

Other difficulties will arise in applying this method, but they cannot be detailed here. It is the purpose of this paper merely to call the method to the attention of those unacquainted with it, so that they may learn from experiment whether it may be used in specific cases. If the method is understood, then the problems specific to any given application may be worked out as they arise.

The steps to be taken in controlling a dye bath by spectrophometric means, then, are these:

1. Measure the pure components in approximately the same concentration as they will have in the dye bath (or diluted dye bath) samples which will be measured. Measurements should be made at three wavelengths chosen so that the density of the dyes will be as different as possible from one another. These same three wavelengths must, of course, be used for all measurements.

2. From this data calculate the k's and then the K's and substitute the K's in equation 6.

3. Take a sample of the standard dye bath and measure it. (It may be necessary here to dilute the sample a known amount in order to make accurate measurements on the spectrophotometer.) Calculate the standard concentrations from equation 6. (These calculated concentrations may not be equal to the known concentrations because of errors in evaluating the K's.)

4. Take a sample of the bath to be corrected and measure it. (Dilute, if necessary, by the same amount as in step 3.) Calculate the concentration of the components from equation 6.

5. Compare the calculated concentrations of the components in steps 3 and 4. Calculate the amounts of the components which must be added to or subtracted from the bath to make it standard.

Steps 1, 2 and 3 need be taken only once for any dyebath composed of the same three dyes. Steps 4 and 5 must, of course, be taken each time a correction to the bath is to be made.

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Abrasion Testing—

(Concluded from Page 627)

18. Schiefer, H. F. and Cleveland, R. S. "Wear of Carpets." *Textile Mfr.*, 60:182 (1934).

19. Schiefer, Herbert F.; Crean, Lawrence E. and Krasny, John F. "Improved Single-Unit Schiefer Abrasion Testing Machine". *J. Research Nat. Bur. Standards*, 42:481 (1949).

20. Schiefer, Herbert F.; Fourt, Lyman and Kropf, Richard T. "Textile Testing in Germany, Part II." *Textile Research J.* 18:18 (1948).

21. Schiefer, Herbert F. and Krasny, John F. "Note on the Disintegration of Wool in Abrasion Tests." *Textile Research J.*, 19:802 (1949).

22. Skinkle, J. H. "Textile Testing' Howes Publishing Company, New York, N. Y. pp. 97-103 (1940).

23. Stoll R. G. "An Improved Multipurpose Abrasion Tester and Its Application for the Evaluation of the Wear Resistance of Textiles." *Textile Research J.*, 19:394 (1949).

24. Tait, J. H. "Abrasion Resistance of Rayon Lining." *Rayon Textile Monthly*, 26:41 (1945).

25. Tanenhaus, Seaman J. and Winston, Gerald. "First Report of the A.S.T.M. Task Group Studying the Wysenbeek Precision Wear Test Meter." Textile Series—Report Number 45, Philadelphia Quartermaster Depot Research and Development Division.

26. Tanenhaus, Seaman J. and Winston, Gerald. "Second Report of the A.S.T.M. Task Group Studying the Wyzenbeek Precision Wear Test Meter." Textile Series—Report Number 50, Philadelphia Quartermaster Research and Development Division.

27. U. S. Institute of Textile Research Conference. "Wear and Wear Testing." *Textile World*, 84:852 (1934).

Proceedings of the
American Association of Textile Chemists and Colorists

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"Advancement, Achievement, Through Continued Cooperation"

29th NATIONAL CONVENTION

Wentworth-By-The-Sea, Portsmouth, N. H.

September 28, 29, 30, 1950

NOTES ABOUT THE CONVENTION SITE

IN selecting the shores of New Hampshire as the site for the National Convention, we have a unique location around which many historic points of interest exist. The region comprises the seashore and tidewater area situated in the southeastern part of the State. Its communities dating back to 1603 still retain the character and traditions of those early days when they served with distinction in the establishment of the United States of America.

In an atmosphere of historic shrines and houses of Colonial and Georgian architecture, preserved through the years, these communities have kept pace with progressive endeavors and offer everything to be desired . . . bathing beaches, always accessible harbors and rivers, bays and streams reaching inland to fine agricultural lands with dairy, fruit, poultry and produce farms which, with good roads, are conveniently near progressive industries, prospective industrial sites and excellent trading centers. Educational institutions are famous. There are conveniently located churches of all denominations.

All this, together with fine hotels, guest houses, cabins, cottages, famous dining places specializing in native sea foods and farm products, modern theatres, sports and recreational facilities, salt water fishing and boating, make this an ideal region in which to visit, live, work and play.

One of the more famous historic houses in Portsmouth is the Lady Pepperrell House, opposite the old Congregational Meeting House at Kittery Point. This structure was built in 1760 by the widow of Sir William Pepperrell, who commanded the Louisburg Expedition in 1745. Lady Pepperrell was Mary, daughter of Grove Hirst, a well-to-do merchant of Boston, and a granddaughter of Judge Samuel Sewall of the Bay Colony. This house, built to conform to the highest standards of spaciousness, elegance and comfort, is marked by a delicacy of proportion and a wealth of detail that form a fitting background for the fine 18th Century furniture and portraits with which it is furnished.

Other historic edifices are the Jackson House, which is the earliest house in town, being built by John Jackson in 1664; the Warner House built in 1716; the Wentworth-Gardner House in 1760; the Moffatt-Ladd House, 1763; and the Sparhawk Mansion in 1742.

Portsmouth is famous for its fishing; its fishing craft leave the docks daily in pursuit of Crustacean fish; its magnificent Isle of Shoals, which is famous for its unsolved murder, may be the plot of a new production by Louis de Rochemont, producer of the recent "Lost Boundaries" which had its setting in New Hampshire. Mr. de Rochemont, incidentally, is a resident of Newington, a small suburb of Portsmouth.

Portsmouth's adjoining coastline is also noted for its many large and beautiful beaches, such as Hampton Beach, Rye Beach and Seabrook Beach. In nearby towns, such as Dover, Exeter and Newmarket, are situated large textile properties. In the Town of Durham is located the University of New Hampshire, and, of course, Exeter is also famous for Phillips Exeter Academy. There are several fine golf courses located at convenient distances from Portsmouth.

The center of our Convention is the Wentworth-By-The-Sea which, standing as it does on the majestic cliffs of New Castle, offers all of the atmosphere for bathing, swimming, golfing, tennis, horseback riding, boating, fishing, etc., and, of course, not forgetting to mention the excellent seafood dinners supplied fresh daily from the local fishermen.

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NATIONAL CONVENTIONS

1950: September 28 to 30. Portsmouth, N. H
1951: October 17-18-19, Statler, New York.
1952: Boston.

HUDSON-MOHAWK SECTION

Meetings: Oct. 20 (Utica), Dec. 8 (Albany), Jan. 19, 1951 (Albany), Mar. 16, 1951 (Albany), May 11, 1951 (Albany), June 22, 1951 (Annual Outing).

MID-WEST SECTION

Meetings: October 28, 1950, February 3, 1951 (Morrison Hotel, Chicago), May 5, 1951 (Hotel Schroeder, Milwaukee), June 16, 1951 (Outing, Lake Lawn Lodge, Delavan, Wis.).

NEW YORK SECTION

Meetings: October 13 (Swiss Chalet, Rochelle Park, N. J.), November 17 (Swiss Chalet), Jan. 12, 1951 (Hotel New Yorker), Feb. 23, 1951 (Hotel New Yorker), March 30, 1951 (Swiss Chalet), May 4, 1951 (Swiss Chalet), June 15, 1951 (Outing).

PHILADELPHIA SECTION

Meetings: October 28 (Meeting-in-Miniature, Philadelphia Textile Institute), December 8, January 19, 1951.

PIEDMONT SECTION

Meeting: October 28 (Charlotte, N. C.)

RESEARCH COMMITTEE

Meetings: Sept. (Portsmouth, N. H., Convention), Nov. 17 (New York).

RHODE ISLAND SECTION

Meetings: October 27 (Providence Engineering Society Hall), November 17 (Johnson's Commodore Room).

SOUTH CENTRAL SECTION

Meeting: Nov. 4 (Hotel Patten, Chattanooga, Tenn.).

SOUTHEASTERN SECTION

Meetings: September 23 (LaGrange, Ga.), December 9 (Atlanta, Ga.).

Intersectional Contest —

A NEW APPROACH TO THE EVALUATION OF WOOL OILS FOR RESISTANCE TO OXIDATION IN STORAGE*

MID-WEST SECTION

INTRODUCTION

LUBRICANTS in the form of wool oils are necessary in the manufacture of wool yarns to minimize breakage of wool fibers in picking and carding, as well as to reduce fly, waste and static electricity. Oil is also needed on the wool to increase cohesion of the fibers in a loose sliver or roping, thus facilitating drafting, condensing and spinning. Wool oil is necessary to produce satisfactory yarn.

The more important requirements of a wool oil, other than its lubricating value, are that it should remain stable in storage under various conditions, should not discolor the wool nor cause spontaneous combustion. These requirements are directly related to the oxidation characteristics of the oil.

The oxidation of wool oils when stored on stock, yarn or fabric has been and still is a source of difficulty in processing wool fabrics. Oils which oxidize easily are more difficult to remove in scouring and seriously affect the dyeing properties of the wool, as well as producing undesirable odors in the finished goods.

One of the quickest indicators of poor resistance to oxidation, with its subsequent deleterious effects, is the well-known "heating in the bin" which practically all woolen manufacturers have experienced. The water content of the oiled stock exercises a catalytic action on oils while in the storage bin in the presence of air and, particularly, light and thereby accelerates their rate of oxidation. Certain dyes are also known to exert a catalytic effect on the oxidation of wool oils.

Committee

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The rate of oxygen absorption by a saponifiable fat or oil such as may be used as a wool lubricant is greatly accelerated by heat and light, particularly ultraviolet or near ultraviolet light. There are two phases to the oxidation of such fats, the first being an induction or slow phase, also known as autoxidation, and the second being a rapid phase, proceeding at a greatly accelerated rate. Many fats darken during the induction phase and then tend to bleach in the second phase.

The importance of knowing the oxidation characteristics of a wool oil was well demonstrated in England in the period between 1919 and 1921. At that time a very serious condition developed in the worsted trade. Hundreds and hundreds of pieces of unevenly dyed goods began to appear in the various mills. The number of pieces was far in excess of any which could be attributed to the usual run of manufacturing conditions. A thorough investigation of this situation traced these pieces down to a common point, which proved to be the use of olive oil substitutes on the yarn. These substitutes were found to possess poor resistance to oxidation, which, coupled with long storage, due to conditions in the trade, lead to incomplete removal in processing and subsequent uneven dyeing.

TESTING METHODS

The need for a reliable accelerated testing method for evaluating the oxidizing characteristics of wool oils is very apparent. Available accelerated methods do not correlate very well with the results obtained under normal storage conditions. Chemical methods, such as the determination of the iodine value of an oil or fat, give a measure of the ultimate degree to which an oil can be oxidized, but do not necessarily indicate the rate at which oxidation will take place. A knowledge of the rate of oxidation of an oil is very important. Moreover, the iodine value appears to be of use on saponifiable fats and oils only.

The Mackey test is reasonably accurate when used on saponifiable oils, but when used to evaluate mineral base oils, it does not correlate at all well with the actual performance of these oils under storage conditions. The Mackey Cloth Oil Tester consists of a double jacketed vessel of copper, in the outer compartment of which water is kept boiling. The inner chamber holds a cylinder of wire gauze, containing a charge of 7 grams of "cotton and/or wool" previously soaked in 14 grams of the oil to be tested. A thermometer is buried in the mass and means are provided for a positive circulation of air. The rise in temperature in one hour is noted.

* Presented in Intersectional Contest, Atlantic City Convention, October 14, 1949.

In this test, a good olive or red oil will go to 208°F.-210°F. in one hour, whereas semi-drying oils such as cottonseed show a rise of temperature to 240°F.-260°F. in one hour. This test is based on the assumption that the greater the rise in temperature for a given time, the more susceptible the oil is to oxidation.

The presence of free fatty acids, either in small or large quantities in a fat, is no indication whatsoever of rancidity or that it will necessarily become rancid.

The National Association of Wool Manufacturers specification and test for light stability or oxidation of a wool oil makes use of the Fade-Ometer. The specification reads, "There shall be no more than a barely perceptible change in color when worsted cloth containing 10% of the mineral oil is exposed for 20 hours in a Fade-Ometer." Others say that "the discoloration produced in the Fade-Ometer is nonremovable."

This test was originally designed for evaluating the straight mineral oils often blended with saponifiable oils to produce worsted oils. This test is also used in the petroleum industry to distinguish conventionally refined mineral oils from those especially refined.

The Fade-Ometer test has, however, gradually been extended to cover all wool oils regardless of type.

Many saponifiable fats and oils are bleached by the intense light from a carbon arc and thus a false evaluation of these products is obtained. On the other hand, some of the newer type mineral base oils when exposed in the Fade-Ometer show a distinct discoloration which, however, is removable in subsequent scouring! Moreover, it is quite disconcerting to see the effect of the Fade-Ometer on the dyeing properties of wool which contains *no* oil.

Another serious drawback to the Fade-Ometer test is the tremendous variation in the intensity of light radiation between Fade-Ometers and even within a single Fade-Ometer. This well-known fact is being carefully studied by our Committee on Light Fastness.

An investigation was conducted on a number of wool oils in an attempt to correlate the Fade-Ometer test with actual storage for periods extending up to 12 months. The conclusion was reached that this method of test was only accurate part of the time in predicting the behavior of wool oils under normal textile storage conditions.

Experience in the fat field has shown that increasing the temperature of storage accelerates oxidation. Accelerated aging tests based on this principle more nearly duplicate normal oxidation of fats than any other known methods.

Too high a temperature often gives misleading results. Investigations over a period of time have shown that a temperature of 120°F. is about as high as it is feasible to go and still retain good correlation with actual aging.

These known facts stimulated a study of the possibilities of developing an accelerated aging test based on this principle. Preliminary work on several wool oils applied to Botany laboratory test fabric, and then exposed to various temperatures and for various periods of time, substantiated the above condition.

THE PROPOSED TEST METHOD

An accelerated test method was developed on this basis and is carried out according to the following procedure:

A ten-gram sample of Botany laboratory test flannel shall be oiled with 10% of the oil to be tested by immersing the test fabric in enough ethyl ether solution of the oil so that the bulk of the solution is immediately absorbed. The sample shall be worked in the remaining solution until all of it is absorbed. The test swatch then shall be hung in a well-ventilated place, preferably a hood, and allowed to remain several hours. Oils which are not completely soluble in ether can be made soluble by adding ethyl alcohol.

The oiled swatch shall then be placed in a closed container such as a one-pint glass preserving jar. The jar shall be closed and then placed in a room or oven maintained at 120°F. ± 2°F. and allowed to remain for three weeks.

A blank shall be run at the same time.

If the effect of the oil on the dyeing properties of the wool is also to be determined, then two swatches shall be prepared and tested as above.

The oil being tested shall be evaluated by comparison with the blank and the degree of discoloration noted.

The effect of aging on the scourability of the oil can be determined by scouring one-half of an exposed test swatch in the Launder-Ometer along with a freshly-oiled swatch.

At present the AATCC has no specific test method for wool oils. In order that this proposed method of test be in the proper condition for consideration by the Research Committee as a tentative AATCC test method, it was decided that the method should be given a thorough inter-laboratory check to establish the reproducibility of the results.

Six different laboratories in the Mid-West Section volunteered to participate in an interlaboratory check of this proposed test method.

PROGRAM FOR THE INTERLABORATORY CHECK

A program was set up for this project which consisted of four phases covering:

1. Natural aging for one year.
2. Accelerated aging at 120°F. for three weeks.
3. Accelerated aging at 190°F. for 16 hours.
4. Fade-Ometer aging.

Eleven wool oils which represented the types in most common use in the woolen industry were selected for this work. They were:

1. Sulfonated Mineral Oil
2. Saponifiable Oil—(Peanut)
3. Compounded Mineral Oil
4. Modified Sulfonated Mineral Oil
5. Modified Sulfonated Mineral Oil
6. Sulfonated Ester plus Superfatted Oil
7. Saponifiable Oil—(Prime Lard)
8. Saponifiable plus Mineral Oil
9. Fatty Ester Blend
10. Fatty Ester
11. Sulfonated Mineral Oil.

In June of 1948, a large number of 10-gram swatches of Botany laboratory test flannel were oiled by one laboratory with 10% of the above oils and distributed to the other laboratories along with blanks of untreated flannel. These swatches were placed in open envelopes and stored where there was free access to air, but a minimum of dirt. This first phase of our project was to provide a background of natural aging for a minimum of one year at several different geographical locations such as Cincinnati, Chicago, and Minneapolis.

The second phase, which consisted of accelerated aging at 120°F. for three weeks, was started in the early part of May of 1949, nearly a year after the first phase. Again, a large number of 10-gram swatches of test fabric was oiled by one laboratory and distributed to the other laboratories along with blanks. The proposed 120°F. test method was then run according to the procedure given under "The Proposed Test Method."

The third and fourth phases of the project were started in the latter part of May, 1949. Again swatches were oiled by one laboratory and distributed to the others. The third phase was included to show the effect of high temperatures on the wool oils and was carried out according to the following procedure.

Ten-gram swatches of test fabric, containing 10% of the oil to be tested applied from ether solution, were hung in a well-ventilated oven maintained at a temperature of 190°F. ± 2°F. and allowed to remain 16 hours. A blank was included. Evaluation was then made by noting the degree of dis-

coloration.

The fourth phase was concerned with the Fade-Ometer test of the National Association of Wool Manufacturers. Swatches of test fabric containing 10% of the oils were exposed for 20 hours in two different Fade-Ometers along with blanks and pieces of the Bureau of Standards calibrating paper.

All of the foregoing tests were synchronized to coincide with one year of actual normal aging. At the conclusion of all four parts of our testing program, the tested swatches were all assembled at one laboratory. They were then divided into groups for subsequent treatments.

To determine the effect of the oils on the scouring and dyeing properties of wool, two groups of tested swatches were carefully scoured together along with blanks in a Smith-Drum rotary hosiery scouring and dyeing machine. The scouring was carried out at 120°F. using a 0.5% soap, 0.2% soda ash solution as given in the *AATCC Yearbook* under mill washing and scouring. Scouring was for 15 minutes followed by three 5-minute rinses.

One half of the exposed, scoured swatches was then dyed with two dyestuffs representative of each of the four classes most commonly used on wool, namely, acid, milling, chrome and metallized. For purposes of illustration the following four were selected:

I. 1% Sulphon Acid Blue B C.I. 209.
10% Glauber's Salt.
The bath was raised to a boil in 45 minutes and boiling continued 30 minutes. The dyestuff was then gradually exhausted with acetic acid over a period of 45 minutes.

II. 2% Wool Fast Blue B C.I. 833.
10% Glauber's Salt.
3% Acetic Acid (28%).
The bath was raised to a boil in 30 minutes, boiling continued 30 minutes, and the dyestuff was finally exhausted with acetic acid over a period of 30 minutes.

III. 2% Acid Anthracene Brown R C.I. 105.
10% Glauber's Salt.
5% Acetic Acid (28%).
The dyebath was raised to a boil in 30 minutes, boiling continued for 30 minutes and the dye was then exhausted with 2% formic acid (85%) over a period of 30 minutes. Top chroming was accomplished with 1% sodium bichromate for one hour.

IV. 2% Palatine Fast Red RNA Pr 327.
8% Sulfuric Acid.
The bath was raised to a boil in 30 minutes and dyeing was continued for one hour.

The tested swatches, some 2000 in number, represent the work done on this project. Twelve hundred of them have been mounted on cards to illustrate the correlation between natural aging, the proposed test, at 120°F., the test at 190°F., and the Fade-Ometer Test. These test swatches were on exhibit at the Convention.

RESULTS

An examination of the tested swatches showed:

I. Excellent correlation between the proposed 120°F. test for three weeks and natural aging in all participating laboratories.

II. Poor correlation between the Fade-Ometer tests and natural aging, and between individual Fade-Ometers.

The eleven oils used in our work vary from excellent to poor in resistance to natural aging based on discoloration and effect on dyeing.

In the case of Fade-Ometer No. 1 little or no difference was shown between the oils and all would be considered acceptable. In the case of Fade-Ometer No. 2, little or no difference was shown between the oils but practically none of them would be considered acceptable. This is particularly true where the swatches have been scoured and dyed. In this case, the blank (without oil) shows the effect of the radiations to a greater degree than does the swatch oiled with an oil known from experience to be the most easily oxidized of the group tested. Twenty hours in Fade-Ometer No. 1 was equivalent to 15 hours on the calibration paper, and 20 hours in Fade-Ometer No. 2 was equivalent to 27 hours on the calibration paper.

This large discrepancy in results obtained further shows the inadequacy of the Fade-Ometer test when applied to a group of wool oils of varying types of composition.

Furthermore, the use of dyestuffs such as Sulphon Acid Blue B to indicate the effect of the oil on the wool when exposed in the Fade-Ometer is open to considerable error since the method used and the care taken in dyeing has considerable bearing on the end result.

The 190°F. test was for information only. In many instances it could be used to advantage as a screening test since those oils which are badly discolored in this test usually possess rather poor resistance to oxidation. However, some of the fatty ester-type wool oils are quite sensitive to this high heat; therefore, this test should not be used when esters are known to be, or suspected of being present.

It is interesting to note the variation in the results of natural aging obtained in the different geographical locations. However, the same difference seems to occur in the proposed test, that is, each laboratory shows remarkably good correlation between the proposed test and natural aging in their locality. The severity of the tests varies somewhat from laboratory to laboratory, but all laboratories classify the oils in much the same order.

SUMMARY AND CONCLUSIONS

This work was done to provide a better test method for evaluating wool oils in respect to aging characteristics and not to evaluate individual wool oils. The characteristics of each individual oil tested have not been discussed and no attempt has been made to rate them. This study has definitely shown that the Fade-Ometer test is not suitable for the evaluation of the usual run of wool oils. It is however, very likely suitable for the purpose for which it was originally intended, that is, to test *straight* mineral oils for their stability to light and oxidation.

The proposed test for evaluating the oxidizing or aging characteristics of wool oils has shown excellent correlation with natural aging and good reproducibility of results.

Since the AATCC has no official method for evaluating the aging or oxidation characteristics of wool oils, the Mid-West Section offers this proposed test method to the Research Committee for consideration as a Tentative AATCC Test Method.

ACKNOWLEDGMENT

The Committee acknowledges with thanks the excellent cooperation given by the following companies:

Armour & Company
Burson Knitting Company
Emery Industries, Inc.
General Dyestuff Corporation
Hart & Harrington
North Star Woolen Mill Company
Procter and Gamble Company
Rock River Woolen Mills
Western Felt Works

for the use of equipment and services of their personnel in the laboratory work and to:

Borne Scrymser Company
Ciba Company, Inc.
Geigy Company, Inc.
E. F. Houghton & Company
National Aniline
E. I. duPont deNemours & Company. Inc.
Nopco Chemical Company
Phoenix Dye Works
Rockford Mitten & Hosiery
Sandoz Chemical Works, Inc.
L. E. Sonneborn Sons, Inc.
Swift & Company

for their contribution of materials.

CATCC–AATCC OPEN FORUM

Montreal, Canada, June 10, 1950

J. ROBERT BONNAR

Moderator

An Open Forum was conducted on June 10th at the joint meeting of members of the AATCC Council and Research Committee and members of the Canadian Association of Textile Colourists and Chemists. J. Robert Bonnar, Chairman of the AATCC Executive Committee on Research and General Research Committee served as moderator. Questions on cotton, wool and synthetic fibers were submitted in advance to the moderator. The board of experts consisted of both CATCC and AATCC members. The board on cotton consisted of Thomas R. Smith, William Williams, J. Leigh, Robert W. Joerger, C. Wells and C. Norris Rabold; on synthetic fibers, Arthur W. Etchells, John Neely, C. K. Teichgraber, Jackson Woodruff, Dr. Coke and Aiden D. Nute; on wool Joseph H. Jones, Frederick C. Traut, John Warner, Dr. Turl and W. Prentice. The accompanying report on the forum was prepared by J. Robert Bonnar.

THE questions on cotton dealt to a great extent with light-fast direct colors, developed blacks and naphthol dyeing. There were also several questions on kier boiling versus J-Box boiling, pH of hypochlorite and crocking. Out of twenty-four questions, fourteen were answered which should be assumed satisfactory considering the time involved.

Questions on synthetic fibers consisted mainly of inquiries as to nylon, dyeing, barre effects, saponification of acetate material and gas fading. There were also several questions concerning resin aftertreatment. Most of the twenty-eight questions were answered.

Shrink resistance and its implications with respect to wool dyeing was the most popular type of question concerning wool. Other questions involved dyeing procedure, effect on final pH of dyed wool, fastness to light and perspiration, and the role of sodium sulfate in the acid bath. Sixteen questions were placed before the board.

The questions and answers follow. Those questions which were not answered, due to lack of time, are not given.

COTTON

In dyeing cotton with fast-to-light direct colors, are there any advantages to be gained by adding the dyes at a temperature above the striking temperature of the individual dyes used?

Answers to this seemed to depend on count, construction and equipment but the universal opinion seems to be that there was probably not much advantage in adding the dyes above the striking temperature of the individual dyes used.

Assuming a group of dyes to be of equal fastness to light, as a general rule would you say that colors which dye under similar conditions would, in combination, give a dyeing which was faster to light than a similar shade produced with dyes which dye at widely different temperatures?

It was not expected that different dyeing properties of direct dyestuffs used in a combination would have any effect on the light fastness of the resulting dyeing.

In the dyeing of developed blacks, quite often bronziness is experienced, especially in the summer months. Is this directly related to the temperature of the diazotizing bath or is there something more involved than temperature alone?

This question brought considerable discussion along the lines that even more than the temperature of the diazotizing bath was the consideration of the metal of which the equipment was made; the temperature of not only the diazotizing bath but also the rinsing should be low and no light should strike the diazotized goods before coupling and that in the main if these considerations were carefully watched there would be no overloading of the pigment with resulting crystallization and crocking which go hand in hand on developed blacks.

In applying cationic softeners to cotton in package machines, what methods should be used to ensure even distribution of the finish throughout the whole load.

Answers to this indicated that consideration should be given to proper dissolving or make-up of application bath, temperature of application, adding equal portions in both flows, pH control and that experimental work should be carried out with each individual softener as they vary in themselves particularly as to particle size.

In developing the various diazo colors on the market, can use be made of the various naphthols as developers, and, if so, are any of them outstanding from the standpoint of increasing fastness to washing or light of the final dyeings?

Several statements were made that naphthols were used here and there for developing diazo colors due to the fact that some increased brightness was effected and the wet fastness improved but in most cases no improvement in light fastness was noted.

Does the pH of the finished material in any way affect the light fastness of fabrics dyed with (a) direct dyes; (b) aftertreated direct dyes; (c) vat dyes?

There was a difference of opinion on this inasmuch as one statement was made that pH on the acid side would have a bad effect on the light fastness, whereas others stated that finishing on the alkaline side was more detrimental with respect to light fastness.

In applying resin finishes to dyed cotton fabrics, especially the thermoplastic resins such as polyvinyl acetate and not including melamine or urea formaldehyde, is there any marked difference in light fastness of the finished material as compared to that before finishing?

Although various opinions were expressed considering various types of resin finishes, the answer to the direct question considering other than melamine or urea formaldehyde was that there was really very little difference in the finished material as compared to before finishing.

Can as satisfactory a kier boil be given by 1 hour (or 3 x 20 mins.) in a J-box as in the old type kier boil?

This question caused considerable comment as to comparison between kier boil and J-box and it was thought that in

many cases J-box boil-off was perfectly satisfactory, depending on construction, material, type of dyeing, preparation before and the final result desired.

It was brought out that it is also impossible to get emulsion in a J-box; temperature is higher in the kier and the time much more extended than in the J-box as it is being run today. Depending on results required controls should be along the lines of wettability, ash content, ether extraction and so forth. It was brought out that the washing after the J-box was considered by many people as not too important but that it should be closely looked into for satisfactory results.

Which type of bleaching, peroxide or hypochlorite, has least damaging effect on cotton?

It was brought out that both peroxide and hypochlorite bleach very satisfactorily if carefully controlled but under most conditions, the peroxide was more deleterious to the fiber.

What is the best method to use to secure maximum crock fastness of a 3% Naphthol AS-SW/Fast Red KB Base combination on Franklin package machines?

Maximum crock fastness is obtained by the use of certain auxiliary chemicals in sharpening the bath during dyeing. Proper make-up of the base from the standpoint of clear solution at the start and proper refrigeration was also necessary. Complete and thorough soaping with proper auxiliaries is also necessary for satisfactory crocking fastness.

Is it possible to obtain equal crock fastness of vat and sulfur dyeings in medium to dark shades by the pad-steam process as compared to jig-dyed goods—if so what is the general procedure?

If properly controlled, there is very little difference in vat and sulfur dyeings in medium to dark shades between the pad-steam process and jig-dyed goods. Proper oxidation, rinsing and soaping should be controlled.

How can selvedge oxidation be overcome when using highly leuco dyeing sulfur dyes in jig dyeing?

Important features which must be carefully watched are as follows:

1—Keep dyeing rate low.

2—Keep salt content low.

3—Be careful to keep dye well dissolved and reduced.

4—Use nonionic retarding agent.

5—Use covered jig where possible.

To what extent is oxycellulose encountered when processing cotton continuously on the J-box method of kier boiling?

If air is kept out, there should be no trouble with oxycellulose when processing cotton continuously on the J-box.

In bleaching cotton in package machines, what is the minimum time for a good white, using peroxide?

After all chemicals are in the tank bring to 190-200°F. in 20-30 mins. and then run 1 hour. Using this as a basis, variations will have to be made at the plant to suit the individual case.

SYNTHETIC FIBERS

Is it possible to produce satisfactory full shades on nylon with vat colors?

It was stated that this is not being done regularly although high temperature dyeing is being investigated. It was also mentioned that the tannic acid method, which has been proposed, is being investigated by various organizations. Work to date brings out the fact that the tinctorial value of most vat colors on nylon is lower although there were several who expressed the opinion that a fairly good range but selective, was possible. The light fastness in general is much poorer than the corresponding type on cotton.

Has the vat acid process any application for the dyeing of nylon piece utilizing a pad?

Several people mentioned that experimental work has been done on this.

Is there any way of pretreating nylon to eliminate the difference in affinity between different batches of yarn?

A suggestion was made that application of dry heat has some effect.

How can I produce fast-to-light shades on uneven viscose? Is there any pretreatment which will improve the dyeing qualities of material of this character?

A light caustic pretreatment was suggested.

Previously dyeing of viscose was recommended at a temperature of 180-200°F. What is the objection to dyeing viscose at the boil (excluding the dyeing of filament skeins)?

Higher temperature would probably result in only slightly better penetration with a somewhat better leveling. It was probably out as far as the use of a box was concerned and the fear was expressed that at high temperatures chaffing would be accelerated.

Can you give a practical formula for the even saponification of acetate piece goods?

8% Trisodium phosphate (based on weight of material) 160°F. to 212°F. Boil 1 hour, test for saponification. If not complete, boil 20 to 30 mins. additional. The operation is completed by rinsing, neutralizing with acetic acid and rinsing. A second method utilized 2 grams per liter caustic soda, 15 grams per liter soda ash, 16 grams per liter dextrine at 130°F. for 1 hour. The dextrine acts as a leveling agent. After testing for completion of saponification, the material is rinsed, neutralized with acetic acid and rinsed.

Is there any permanent anti-fume finish for acetate material which will allow you to use any of the dispersed blue acetate dyes?

There are several chemicals on the the market which greatly enhance the resistance of gas fading of acetate-dyed material but the question of permanence is rather a matter of degree with no definite limitation. Some products on the market are pretreatments, others are aftertreatments and some are applied with the dyestuff. There was a fair amount of discussion concerning the type of gas to which the dyed goods might be subjected and that certain locations in Texas, Brooklyn, Pittsburgh and so forth might be far different than rural locations. The statement was furthermore made that any of these chemical treatments for resistance to gas fading should be looked at from the point of view of results of hand, effect on light fastness and yellowing of the goods in storage.

Washing Thermosetting Resin Treated Rayons:

Why is it necessary to wash?

Under what conditions are latent odors likely to develop?

How much washing is desirable or necessary?

(Open wash or rope wash? One box or three boxes?)

What is the most practical washing medium detergent and/or alkali?

Which type of detergent? Anionic or nonionic?

Which type alkali? Soda ash or ammonia?

This question alone could be the topic of an individual meeting or discussion, but in general the main issue is the removal of surplus resin because of yellowing and latent odors. A method was developed to determine this by a scorching test at 400°F. for 30 seconds. The amount of washing depends on the equipment and thus the scorch test would be the control of the amount of washing.

Is it necessary to heat treat nylon for maximum stability only at temperatures in excess of those to which the fabric will be submitted in use? In other words if the highest temperature to which this fabric will be submitted during the finishing is 300 F. and 212°F. in actual use, then for the standpoint of maximum stability only, why is it necessary or desirable to pre-set goods at 435 F.?

For the maximum softness on certain fabrics the higher temperature is desirable. What causes yellowing of nylon at elevated temperatures? Is it the nylon itself that yellows or some assistant that has been added during manufacturing or weaving? Is it true that this yellowing is not as great when pre-setting is accomplished when gas is used as a source of

heat as when electricity is used as a source of heat? If this is true does this suggest pre-setting in an atmosphere of nitrogen for example?

Heat treatment of nylon for maximum stability should be 15°F., or more, higher than the temperature at which the fabric will be submitted in use. The higher the temperature the shorter the time necessary for the effect needed. The source of heat in the heat treatment in most cases has no bearing on the yellowing but the cleanliness of the nylon to begin is the important factor.

What is being done to increase the tensile strength of spun rayon fabrics which are required in stabilized finish produced by the application of 8-10% urea-formaldehyde in the finishing operation; and also in anti-crease finish using U.F. or melamine resins?

High tenacity fiber can be purchased when necessary for prescribed tensile strength and proper equipment is necessary for proper setting of resins which can have much to do with the resulting strength. In other words, proper application for penetration and proper control of drying to eliminate surface resin are all-important in this type of work.

A dry cleaning plant using the trichlorethylene process has recently experienced trouble with permanent creases developing in acetate and viscose mixture linings. The equipment and procedure used in the process have not been changed and have given very satisfactory results in the past, also the grade and source of supply of the solvent is unchanged. This trouble exists irrespective of the size of the load.

Two questions seem to be the only answer to the original question, namely

(1) Was it possible that the construction of the cloth was changed?
(2) Was the pH of the solvent carefully controlled?

What is the source of the cream color of the Vicara fibers; in other words, is this the color as spun and what is the most effective procedure for bleaching this type of fiber?

It was implied that the yellowness or cream color is not removable by present methods of bleaching and that the manufacturer is studying this problem.

What are the effects of weather conditions on the various types of thermoplastic resins when used as a finish on cellulosic fabrics?

Proper application would eliminate any effect of weather on fabrics treated with thermoplastic resins but contact should be made with the resin suppliers or the technical committee of the Society of Plastics Industry (SPI).

What are the advantages and disadvantages of the various catalysts employed in the curing of urea-formaldehyde resins?

Ammoniacal type of catalyst is cheaper in the curing of urea-formaldehyde resins but the cost from the standpoint of value of the fabric, curing condition in the plant and the careful consideration of odor developments should be taken into consideration.

How can the luster of a staple fiber rayon-wool blend suiting fabric be permanently reduced?

Fabric construction was mentioned as one factor.

Has a standard test method been established for assessing shrinkage control of launderable rayon?

Various technical organizations such as AATCC have either tentative methods for this or have it under study at the present time.

Experience has taught us that viscose rayon, dyed fast to sunlight, for window curtains, when exposed to strong sunlight, usually back of a glass window, degradates rather rapidly. Colors where this degradation appears are yellow, gold and blues. Has any method of dyeing "fast to sun" colors been devised by which dyes or pigment can be used on the yarn or fabric so that they will resist ultraviolet rays better than they do at the present time?

There is apparently a catalytic effect of the dyes with resulting formation of oxycellulose.

WOOL

Wool and cotton blends, containing acetate specks:

Does the use of Thiotan RS, or similar materials, restrain the acetate dyestuffs from staining the wool, in addition to helping to keep the cotton dyestuffs off the fiber? Or is the restraining action solely on the cotton colors?

There was no definite answer to this but it seems to be the consensus of opinion that Thiotan RS has a restraining action only on the direct colors.

Shrink-resistant yarn, baby blue and baby pink shades, hand knitting yarns:

In Canada where the volume is insufficient to warrant vat dyeing in the form of slubbing or raw stock, the fastness both to light and washing of these two shades on knitting yarns made shrink-resistant, has been found inadequate. Generally the two shades are dyed with Rhodamine B or Acid Rhodamine for the pink, and Alizarine Supra Sky RA for the blue. Any suggestions for the improvement of the fastness to light, and washing, of these two shades on this type of yarn would be appreciated.

Two forum members stated that only by a proper choice of dyestuffs carefully tested was a restricted range of shades possible along the lines of this question. Certain of the Milling Blues as well as dyeings of leuco esters of vat colors have found acceptance in certain of these lines.

Wool-Nylon Blends—Dyeing of:

While the heading of "wool" may have had the intention to restrict the questions to this fiber alone, yet by far the largest number of questions concerned the dyeing of uniform shades on wool-nylon blends where the nylon was present to the extent of 35% or more. Dyeing full shades of navy, maroon, dark brown and black, and also scarlet, continue to present serious difficulty to yarn dyers, who are asked to provide the same fastness as previously obtained on worsted yarn, as regards light, washing and perspiration. Specific recommendations for any of these shades would be welcome.

Here again the blend at hand must be carefully investigated as to construction, type of nylon and end use must be taken into account. Careful consideration to type of dyestuffs must be made and a limited range is all that is possible at present.

In Canada where both machine and hand knitting yarns are almost entirely yarn dyed in the Samual Pegg and Son (Hussong type) or Klauder-Weldon yarn dyeing machines, the problem of levelling some of the newer and faster colors on the Carbolan, Polar, Cloth Fast, Alizarine and Xylene Milling ranges, is extreme indeed. Some dyers have tried the Goodall method others have buffered dyebaths with various phosphates, particularly dihydrogen phosphate, and recently I.C.I. have brought out Carbolan Salt A, but there is no general agreement on a levelling agent or buffer to insure even dyeings with such rapid exhausting colors on worsted yarn. It may be that close pH control plus a buffer is needed. Suggestions in this connection would be welcome.

Several members of the forum brought out the fact that Carbolan Salt A is not fool proof. The statement was made that the adjustment of pH to 7.2 approximately is important and that many mills are investigating this matter within their own organization.

What is the consensus of opinion at the present time, of the effect of the use of metallized dyes with high concentrations of sulfuric acid, on the ability of the dyed material to withstand subsequent abrasive treatment? Would the use of Palatine Fast Salt O or Neolan Salt P in the dyebath,

thereby reducing the amount of acid required, have a beneficial effect on the resistance to abrasion of goods dyed with metallized colors?

The general opinion was that a pH of 5 to 7 was the best from the standpoint of abrasion resistance and that lower acid content by the use of such products as listed would be beneficial.

If the material or yarn is shrinkproofed after dyeing, does the choice of dyes used in anyway affect the uniformity of the shrinkproofing treatment?

It was mentioned that satisfactory results can be obtained by this method, that is, shrink-proofing after dyeing but that a very careful selection of the dyestuffs must be made.

If a given shade is dyed by either top chrome, bottom chrome, metachrome, metallized or milling dye methods, on the same type of material, would felting properties of the same material vary with the different dyeing methods and colors?

This question brought out the fact that felting properties are radically different between one dyeing method and another. Certain dyes such as Alizarine Light Brown BL, Black P2BA and so forth should be investigated as well as the residual acidity in wool.

What is the complete role played by sodium sulfate in the acid dyeing of wool? How is this affected by the type of dye used?

This question can also be made the subject of a complete and lengthy discussion. It was brought out that there is much in the literature reporting research on this problem as sodium sulfate affects different dyes differently. Those interested in this question should consult particularly work done in England over the past several years. (Goodall)

In testing for "moth resistance" should tests be carried out both with the larvae of the carpet beetle and of the webbing clothes moth?

In general, material resistant to carpet beetles would also be resistant to webbing clothes moths but not the reverse.

Philadelphia Section to Hold "Meeting in Miniature", October 28th

THE next regular meeting of the Philadelphia Section will be an all day "Meeting in Miniature" to be held Saturday, October 28, 1950 at the Philadelphia Textile Institute, School House Lane and Henry Avenue, Germantown, Pa.

The meeting will highlight symposiums on wool, cotton, synthetics and hosiery

Harry L. Morgan

with papers to be presented by practical men who are tops in their fields. It should adequately cover the interests of textile men and provide an excellent opportunity for practical discussions relating to their respective fields.

Harry L. Morgan, Laboratory Director, James Lees & Sons Co., is program Chairman with M. H. Klein, Sandoz Chemical Works, as Co-Chairman. Richard B. Stehle, Brehm and Stehle, Philadelphia AATCC Chairman, is serving in an advisory capacity.

Tentative Program

9:00 A.M. Registration, Lobby.
9:00-10:00 A.M. Tour of School.
10:00-12:30, Symposiums.

Group I—WOOL—Room 110

Chairman: Richard A. Shimp, E. I. Du Pont de Nemours & Co., Inc.

"Stock and Yarn Dyeing"

William Ebersold, James Lees & Sons Co.

"Piece Goods Dyeing"

Alfred F. Felgendreger, Continental Mills, Inc.

"Chemical Processes"

Dr. Milton Harris, Harris Research Laboratories.

Group II—COTTON—Room 104

Chairman: Heyward F. Lawton, Rohm & Haas Co.

"Chemical Processes of Cotton Fabrics including Bleaching"

Dr. Walter M. Scott, U. S. Dept. of Agriculture and Industrial Chemistry.

"Dyeing"—to be announced.

"Finishing"—to be announced.

Group III—HOSIERY—Room 207

Chairman: Virgil T. Hartquist, Jefferies Dyeing Works.

"Spun Yarn Preparation—Wool, Nylon and Cotton"

Ira Schwartz, Nathan Schwartz Sons.

"Yarn Preparation—Ladies Full Fashioned Hosiery"

To be announced.

"Dyeing of Ladies Full Fashioned Hosiery"

John Koch, Jr., The Artcraft Hosiery Sales Corp.

"Dyeing of Men's and Children's Hosiery"

To be announced.

12:30 P.M. LUNCHEON—P.T.I. Cafeteria, Tour of School.

Start in Lobby.

1:45 P.M. BUSINESS MEETING—Rooms 207-209.

(Regular Sectional meeting).

Section Chairman: Richard B. Stehle.

* * * *

Presentation: G.E. Spectrophotometer to P.T.I. Ernest E. Rettberg, Jr., Asst. General Chairman, 1949 AATC National Convention.

Acceptance: Bertrand W. Hayward, Director Phila. Textile Institute.

Use of Spectrophotometer: Constantin J. Monego, Asst. Prof. of Dyeing and Printing, Philadelphia Textile Institute.

* * * *

Group IV — SYNTHETIC FIBERS — Rooms 207-209

Chairman: Dr. Hugh H. Mosher, Quaker Chemical Products Co.

"Preparation of Yarns"

David Cook, Quaker Chemical Products Co.

"Dyeing of Fabrics"

Arthur W. Etchells, Hellwig Dyeing Corp.

"Chemical Finishing"

Albert C. Nuessle, Rohm & Haas Co.

"Mechanical Aspects of Finishing of Fabrics"

Edward S. Pierce, H. W. Butterworth & Sons.

Committee

Chairman: Harry L. Morgan, James Lees & Sons Co.

Co-Chairman: M. H. Klein, Sandoz Chemical Works, Inc.

Advisory: Richard B. Stehle, Brehm & Stehle.

Secretary: Thomas H. Hart, Hart Products Corp.

Treasurer: Edward C. Diehl, Ankokas Processing Co.

Publicity: Thomas J. Scanlon, American Cyan. Co. Calco Chemical Div.

Registration: A. E. Raimo, John Campbell & Co. Inc.

Luncheon: Frederick V. Traut, Globe Dye Works.

Equipment: Norman V. Feldpush, Wilson & Co.

Reception: Margaret B. Hays, U. S. Naval Base, Naval Air Experiment Station.

Representatives P.T.I.:—Bertrand W. Hayward, Director of P.T.I., and Percival Theel, Coordinator of Research.

School Tours:—Thomas R. Foltz, Jr., Asst. Prof. of Chemistry, P.T.I.

Chairman P.T.I. Student Chapter—Walter T. Ambrogi, Jr.

First Summer Outing, Southeastern Section

THE Southeastern Section held its first Summer Outing on June 9th and 10th at Radium Springs, Georgia (near Albany). Over 100 members and their wives attended.

Registration began Friday noon and the first event was a bingo party Friday evening at which many gifts, donated by the mills in the area, were distributed as prizes.

Activities on Saturday included a get-acquainted party for ladies, bridge for ladies and men, a golf tournament, a horseshoe pitching tournament, a shuffleboard tournament, a social hour, and a banquet and dance.

At the get-acquainted party for ladies refreshments were served and favors distributed. R. P. Timmerman of *Graniteville Company* won the first prize of a meat carving set at men's bridge and Mrs. Timmerman received a Mixmaster as first prize in ladies' bridge.

Quinn G. McCombs of *Holeproof Hosiery* won low gross in the golf tournament with a score of 75 and H. Gillespie Smith of *Calco* won low net with a 68. Other golf winners were: T. Howard McCamy, *Pepperell Manufacturing Company,* William Haines, *Hercules Powder Company,* Brackett B. Fernald, Jr., *Esmond Chemical Co.,* S. I. Parker, *Ciba Company,* Robert Price, *Pepperell Manufacturing Company,* Walter Hope, *A. E. Staley Co.,* Donald Barnes, *Arnold, Hoffman Co.,* and Nesbit Johnston, *Geigy Company.*

Walter Hope won the first prize of a clock radio in the horseshoe pitching tournament and Warren Tiller of *Tennessee Corp.,* won an electric fan for second prize.

General chairman of the outing was T. Howard McCamy assisted by the following:

A. J. Morse *(Clark Thread)*—Finance.

Daniel S. Rion *(Nopco Chemical)*—Entertainment.

C. Russell Gill *(Southern Sizing)*—Golf.

William B. Griffin *(Kali)*—Ladies.

J. Lindsay Wyman *(Nova Chemical)*—Wining and Dining.

Milton May *(Textile Industries)*—Publicity.

Earle Mauldin *(Textile World)*—Publicity.

Claude B. Suttle, Jr. *(American Cyanamid)*—Photographer.

A. K. Haynes *(Rohm & Haas)*—Registration.

William Haines *(Hercules Powder)*—Registration.

The highlight of the outing was the banquet-dance on Saturday night at which a smorgasbord was served and the many prizes awarded. Due to the enjoyable time it is believed that next year the attendance will double and plans are already under way to accommodate the additional members.

Southeastern Section Outing Photos

Mrs. Lee, H. Gillespie Smith (Calco), Chester Lee, Edward R. Ravenel (Myles Salt—Back to Camera)

Brackett B. Fernald, Jr. (Esmond Chemical), Irving Royce (Royce Chemical), James M. Ross (F. H. Ross), Francis S. Webster (F. H. Ross)

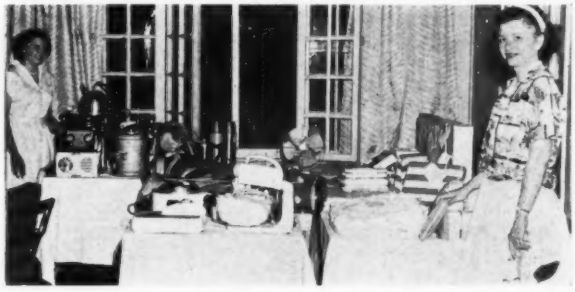
Earle Mauldin (Textile World), Mrs. Dozier, Henry L. Dozier (Adelaide Mills)

Louis M. Burke (Muscogee), C. Russell Gill (Southern Sizing), J. Lindsay Wyman (Nova Chemical), Robert W. Price (Pepperell)

Boyce Estes (Clinton Starch), William E. Fayssoux (Royce Chemical), Robert Hallowell (Clark Thread), H. Gillespie Smith (Calco)

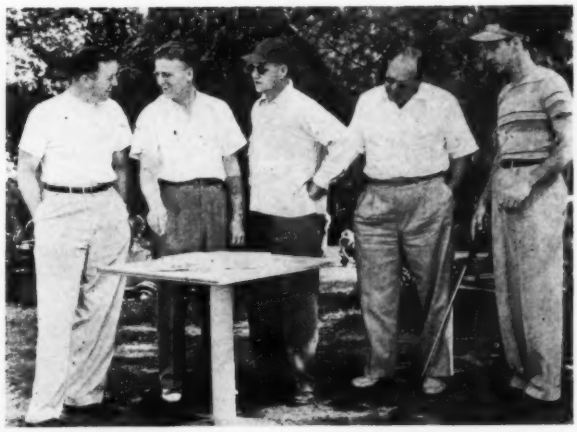
Donald A. Barnes (Arnold, Hoffman), T. Howard McCamy (Pepperell), Walter Hope (Staley), Quinn G. McCombs (Holeproof Hosiery)

Stella Searcy, William Pearson, Catherine Griffin, William Griffin, William Searcy, Stribling, Pauline Keeton, James Swiney.



Mrs. Warren Tiller and Mrs. Joseph Oliver with the Display of Prizes.

Louis Dozier (Adelaide Mills), Nesbit Johnston (Geigy), Kenneth Makant (Clark Thread), R. H. Dickinson (Clark Thread), Norman P. Arnold (DuPont).



Brackett B. Fernald, Jr. (Esmond Chemical), Norman P. Arnold (DuPont), Francis S. Webster, Jr. (F. H. Ross), W. Delaney, T. Howard McCamy (Pepperell)

William B. Uhler (Blackman-Uhler), Joseph P. Clancy (Emery Industries), Harold B. Peterson (Virginia Smelting), Bozeman (Russell Mfg.), Dudley B. Setzler (Dexter Chemical).

Mrs. Buckner, James M. Buckner (Muscogee), Martha Davis, Stella Searcy, Nesbit Johnston (Geigy), Mrs. Johnston.

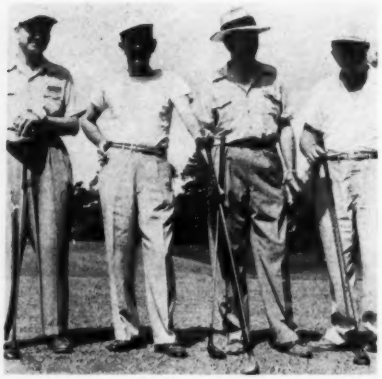
ADDITIONAL OUTING PHOTOS ON FOLLOWING PAGE

William Searcy (Warwick Chemical), William E. Fayssoux (Royce Chemical), Stribling (Aridye), William Pearson (Crystal Springs), Stella Searcy, Irving Royce (Royce Chemical), James W. Swiney (Fulton Bag), John B. Tatum (American Cyanamid), George L. Dozier (Southern Dyestuff), Warren E. Tiller (Tennessee Corp.)

Sally Wyman, J. Lindsay Wyman (Nova Chemical), John K. Boykin (National Aniline), Phoebe Boykin

Margaret Gill, Kathryn McCamy, Annette Dozier, Sally Wyman

William E. Keeton (American Finishing), Mrs. Keeton



Paul M. McLarty (Thomaston Mills), W. Hayden Jackson (National Aniline), Thomas Davis (Carbic), William R. Jones (Dundee Mills)

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

50-25

Education: B.S. in chemistry, with graduate work.

Experience: Research in textile chemistry.

Age 37; married; references; New England preferred.

9-18, 10-2

PLEASE NOTIFY THE NATIONAL SECRETARY OF ADDRESS CHANGES

TRADE NOTES

• Nomenclature of Artificial Fibers*

The question of nomenclature of the artificial fibers in Germany has now been decided, as is reported in "Dorland Textil Report", Vol. 15, No. 12/50, p. 41. All artificial fibers are to be called "Chemiefasern", and filament rayon, the former "Kunstseide", is to be termed "Reyon". "Zellwolle" (the staple fiber) remains "Zellwolle". The sponsoring body "Arbeitsgemeinschaft Kunstseide und Zellwollindustrie" has changed its name to "Industrievereinigung Chemiefaser."

This decision is severely criticized in "Kunstseide und Zellwolle", Vol. 25, No. 4, p. 111. The Journal has been placed in an unfortunate position, since it would have to change its name, a difficult thing to do after 28 years of existence. It is pointed out that it would have been better to review the whole field of artificial fibers and if a new term has to be coined, to embrace the synthetic fibers too. (This is reminiscent of the dispute between Britain and the U. S. A. with regard to the term "Rayon"). It is further pointed out that something should be done about the term "Faser (Fiber)". A filament is not really a fiber, and the term "Chemiefaser" is therefore not satisfactory, it is stated.

* British Rayon and Silk Journal, June, 1950, page 68.

• U. S. Rubber Transfers Printing Materials

United States Rubber Company, Rockefeller Center, New York 20, New York, has announced transfer of sales and technical service activities for printing materials from New York to Providence. The move is intended to provide closer coordination between sales and production. Headquarters in Providence will be at the company's plant at 355 Valley Street. Printing materials manufactured by the company include: offset blankets, endless blankets, textile printing blankets, engraver's gum, unvulcanized gum, vacuum frame blankets, newspaper cutting rubbers, newspaper blankets and inking rolls.

• Triton X-100 Price Reduced

Rohm & Haas Company, Washington Square, Philadelphia 5, Pennsylvania, has announced a reduction up to 1¼c per pound in the price of Triton X-100, a nonionic detergent and wetting agent.

• Will Corporation Purchases Callahan Company

The Will Corporation, distributor of laboratory equipment and supplies, has acquired its fifth division with the purchase of the business of E. J. Callahan & Co., Baltimore, Maryland, and will operate it under the name of Will Corporation of Maryland. E. J. Callahan, former owner, has been named a Vice-President of the Will Corpoartion. Joseph H. Dunn, formerly associated with Will in Rochester and Buffalo, will operate the Baltimore Division.

• To Address DCAT Meeting

Dr. J. O'Neill Closs, Executive Secretary of the American Pharmaceutical Manufacturers' Association, will address the Drug, Chemical and Allied Trades Section of the New York Board of Trade, Inc., at its 60th Annual Meeting to be held at Shawnee Inn, Shawnee-on-the-Delaware, Pennsylvania, September 22. He will speak at the business session and his subject will be "Trade Associations and Industry Problems".

• LTI Trustees Election

Harold W. Leitch, General Superintendent in Charge of Research for Pacific Mills, Lawrence, Massachusetts, was reelected Chairman of the Board of Trustees of Lowell Textile Institute at a recent meeting. Samuel Pinanski, President of the American Theatres Corporation, Boston, was reelected Vice-Chairman. Both men, veteran members of the Board, are alumni of the Institute. James H. Murray and Charles J. Scully, recently appointed to the Board of Governor Paul A. Dever were present at the meeting. Mr. Murray is an executive of the Murray Leather Company of Woburn and Mr. Scully is a member of the faculty at Boston College.

• Permutit Acquires AC Ion Exchangers

The Permutit Company, 330 West 42nd Street, New York 18, New York has acquired from the American Cyanamid Company its ion exchange business and the trademark "Ionac". These materials will be manufactured and distributed by Permutit's subsidiary, The American Zeolite Corporation.

• American Dyewood to Resume Chester Operations

Resumption of operations at the Chester plant of American Dyewood Co. has been announced by David S. Fischman, President of United Dyewood Corporation, of which American Dyewood is a subsidiary. Manufacturing operations at the plant had been discontinued last April and transferred to plants at Belleville, N. J. and Jamaica, B. W. I. The plant represents the oldest industry in Chester, founded 115 years go. Present production schedules require only a part of the plant but research is being conducted on products for possible manufacture in the rest of the plant which may be announced within the next two months dependent on the outcome of the research and the availability of raw materials. The plant resumed operations immediately in the production of dyes from dyewood extracts received from the company's West Indies Chemical Works. The old process of chipping the dye-bearing logs at the Chester plant will be discontinued and processing of the extracts will be emphasized.

• National Cotton Week, 1951

The National Cotton Council has announced that 1951 National Cotton Week will be observed April 29 to May 5. Promotions will be built around the theme "It's Cotton Time! First for Freshness, First for Comfort, First for You."

OBITUARY

ALBERT H. HOLT

ALBERT H. HOLT, General Manager of H. W. Butterworth & Sons Co., Philadelphia, until his retirement three years ago, died suddenly on August 24th. He was 63. His death occurred while he was attending a meeting of the Gloucester City Sewage Authority of which he was Chairman.

Mr. Holt, a Director of the Butterworth firm, was prominent in public life for 20 years in Gloucester, New Jersey. His career included service as Councilman, Member of the Board of Education, and Manager of the Municipal Water Plant. Gloucester City municipal offices, Camden county offices and the Gloucester public library were closed out of respect to Mr. Holt on the day of his funeral.

He is survived by his widow.

Robert L. Frank

DR. ROBERT L. FRANK has joined Edwal Laboratories, Inc., Ringwood, Illinois, as Director of Research. Dr. Frank was graduated from Dartmouth College and obtained his Ph.D. at the University of Wisconsin in 1940 and has since been on the faculty of the University of Illinois. He will assume responsibility for all of Edwal's research activities. MORTON SCHWARCZ, formerly Chief Chemist in Charge of Research, will be responsible for the coordination and administration of special projects and contract manufacturing and will assist the firm's president in other technical matters. DR. J. F. KAPLAN has assumed charge of manufacturing operations.

M. J. McCARTHY, Vice-President in Charge of Purchases for A. Gross & Co., 295 Madison Avenue, New York 17, New York, will sever his connection with that company at the end of the year. He has been with the organization for the past 19 years and was formerly in charge of sales. His future plans will be announced at a later date.

GEORGE C. RAMEY has been appointed as Director of Field Sales for Dan River Mills, Inc. He will be charged with the supervision of salesmen, distribution and all branch offices. He was previously Sales Manager of the Finished Apparel Fabrics Division of Springs Mills and prior to that he was with American Cyanamid Company and Forstmann Woolen Company.

George C. Ramey

W. J. KRAMER has joined the Lotte Chemical Company, Inc., Paterson, New Jersey, as Vice-President in Charge of Sales. He has had broad experience in the industrial chemical industry during the past twenty-five years. He was formerly associated in executive sales capacities with General Chemical Co. and the American Agricultural Chemical Co. He was also Vice-President and General Manager of Philipp Brothers Chemicals, Inc.

DR. GUSTAVUS J. ESSELEN, Vice-President of the United States Testing Company, Inc., Hoboken, New Jersey, was recently elected Vice-President of the Society of Chemical Industry, London, England. He has been Chairman of the American Section of the Society for the past year and will continue in this capacity. Dr. Esselen is in charge of the Esselen Research Division of U. S. Testing and has his offices and laboratories in Boston.

PERSONNEL NEWS

DR. FREDERICK G. KEYES has joined Alfred Bicknell Associates as Director of Research and Development. In 1910 Dr. Keyes held the Chair of Research Associate in Physical Chemistry at MIT, and from 1913 to 1916 he served as Chief Engineer of Cooper-Hewitt Electric Co. He was a Lieutenant Colonel in Chemical Warfare during the first world war and in 1922 was appointed Chairman of the Department of Chemistry at MIT where he served for 23 years. Alfred Bicknell Associates are engaged in the development and manufacture of scientific equipment.

CHARLES E. SMART has been elected President of W. & L. E. Gurley, Troy, New York, manufacturers of engineering and surveying instruments. Mr. Smart joined Gurley as Works Manager in 1920 and became a Director in 1926. In 1945 he was elected Secretary, the office he held until his election as successor to C. I. Day, who died in June. LESTER C. HIGBEE, General Sales Manager, has been elected Secretary. Mr. Higbee has been with the company since 1915, serving successively as Production Engineer, Office Manager, Salesman, Advertising Manager, Development Engineer and Sales Manager. Mr. Smart received his B. S. degree from MIT in 1905 and Mr. Higbee is a civil engineering graduate of Rensselaer, class of 1912.

Charles E. Smart

ALEXANDER J. WUERTZ has retired after more than 31 years as a chemist with DuPont. On September 15, however, he will take charge of the plant safety program of the Manufacturing Chemists Association with headquarters in Washington. Mr. Wuertz started with the company in 1919 and was associated with DuPont's pioneering work in developing dye-making processes at the Organic Chemicals Department's Jackson Laboratory at Deepwater Point, N. P. From that time he held a variety of administrative positions, the latest being technical assistant in the department's Wilmington headquarters. Mr. Wuertz' home is in Kennett Square, Pa.

DR. ROBERT H. STEINER has been appointed Research Coordinator according to an announcement by George L. Wirtz, president of Atlas Mineral Products Company, Mertztown, Pa. He has been employed by the Firestone Tire and Rubber Company for the past seven years.

Robert H. Steiner

L. Douglas Weiford

L. DOUGLAS WEIFORD, in charge of government relations for the Stauffer Chemical Company, has been transferred from the New York office to Washington. In addition to government work, Mr. Weiford will handle sales development work in the nearby states. He will make his headquarters at 7210 Ramsgate Road, Washington 16, D. C.

Nine chemists and engineers have been added to the technical or professional staffs of the Grasselli Works Division, General Aniline & Film Corporation, Linden, N. J., it is announced by Paul L. Davis, personnel relations manager. Eight are residents of New Jersey. DR. ARTHUR E. BROWN and DR. SEYMOUR POLANSKY have joined the Process Development Department; JAMES F. ST. CLAIR, a former vice president of the Wilson Organic Chemical Co., has been named a senior control chemist in the Intermediates Department; STEPHEN F. GILL and JOHN PORADA have been hired as junior engineers in the Engineering Department; CHARLES BECHT has been named safety engineer in the Personnel Relations Department; THEODORE H. COLLORA has joined the Industrial Engineering staff; FRANKLIN A. RETZKE has become a junior chemical engineer in that department; and DAVID ROLLER is training as a chemical engineer in the Special Products Area.

JOHN H. HILLDRING has been appointed General Manager of Foreign Operations in charge of the newly-created Export Division of General Aniline & Film Corporation. A combat officer in both wars, Major General Hilldring is a former Director of Military Government in the War Department, Assistant Secretary of State under Secretaries Byrnes and Marshall, and a member of the U. S. Delegation to the Second General Assembly of the United Nations.

NEW PRODUCTS

• Alkyl Phenol C-9

A new alkyl phenol, alkylphenol C-9, a mixture of monoalkyl phenols predominantly para substituted, has recently been announced by Jefferson Chemical Company, Inc., 711 Fifth Avenue, New York 22, New York. The hydroxyl number is 253. It is a pale yellow liquid said to possess a relatively high viscosity and a characteristic phenol odor. It is suggested for use as a nonionic detergent intermediate, in the manufacture of lubricating oil additives, and in the preparation of various resins and plasticizers. A technical bulletin is available.

• Evanacid 3 CS

A new organic acid, Evanacid 3 CS, a tricarboxylic acid containing a thioether group, has been produced in pilot plant quantities by Evans Chemetics, Inc., 250 East 43rd Street, New York 17, New York. Special uses of the new acid and its derivatives are for resins, plasticizers, surface active agents, oil additives, intermediates for rubber chemicals and dyestuffs, stabilizers for vinyl resins and chlorinated rubber, and in the pharmaceutical and agricultural chemical industries. A brochure describing the product is available.

• Atco Carbowet B and Atco Carbowet BF

The Atlantic Chemical Co., Inc., Centredale, Rhode Island, has developed two new foaming and nonfoaming carbonizing assistants which are said to have helped materially to increase the speed and thoroughness of piece carbonizing. These products, Atco Carbowet B and Atco Carbowet BF, are said to have exceedingly high wetting and penetrating speeds in carbonizing solutions. It is stated that tests on wool containing high percentages of vegetable matter, including shives and burrs, have proved very successful. It is claimed that actual plant runs indicate faster penetration of sulfuric acid into the vegetable matter and a definite increase in carbonizing efficiency coupled with a notable decrease in time necessary to accomplish the dry milling operation. Details and product samples are available.

• Neozyme High Temperature

Howard C. Royce, Vice-President in Charge of Sales, Royce Chemical Company, Carlton Hill, New Jersey, has announced production of Neozyme High Temperature, a new enzymatic desizer that is said to meet today's demands for high speed continuous operation. The product can be safely used at working temperatures up to 190°F. without fear of destroying the enzyme, it is stated. No addition of chemicals is required to control the pH or to activate the enzyme. To introduce and service Neozyme High Temperature, Royce has added two technical salesmen to their staff.

• Curled Monel Metal Sponge

A metal sponge, made of a continuous ribbon of curled Monel, may be the answer to some specific cleaning problems. The sponge, a product of Kleenette Manufacturing Company, 1269 W. North Ave., Chicago 22, Ill. is said to be soft, flexible, rust and corrosion-resistant, and hard enough to withstand long wear. It reportedly will not dull, mar, or otherwise damage the surfaces on which it is used.

Kleenette Monel Metal Sponge

TRADE LITERATURE

Chemicals for Textiles—Research Bulletin No. 48 issued by Research Information Service, 509 Fifth Avenue, New York 17, N. Y. It is divided into four sections: "Preparation of Intermediates", "Processing and Application", "New Products and Manufacturing Processes", and "Team Reports". It is stated that a large number of hitherto unpublished German patent applications, including some of very recent date, as well as research reports and manufacturing processes in the field of textile auxiliaries are listed in this bulletin. Seventy-odd reports are catalogued by title, author and, where applicable, patent application number and/or PB number, with filing dates included in some cases. Copies are available without charge.

Proposed Simplified Practice Recommendation for Vinyl and Pyroxylin Coated Fabrics—has been submitted to producers, distributors, users and others for acceptance or comment by the Commodity Standards Division, Office of Industry and Commerce, Washington 25, D. C. This recommendation was proposed by the Plastic Coatings and Film Association. Mimeographed copies are available.

American FIAT Review of German Science—to close a gap in scientific knowledge resulting from the six-year wartime barrier between German scientists and the rest of the world. The original German-language FIAT (Field Information Agency, Technical) Review of German Science: Allied Edition, is an 88-volume, 20,000-page compendium of German achievements in biology, chemistry, mathematics, medicine, physics and the earth sciences, which was started at the war's end. The current review brings this material completely translated into English. Supplementing the information is a collection fo 50,000 PB reports in the German technological collection of O.T.S. A free descriptive catalog of the titles is available from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. While the American FIAT Review is being privately published, O.T.S. announced its intention of maintaining a limited free loan service. Persons may have their name put on the waiting list for loan copies of individual titles.

Southern Textile Exposition

(Concluded from Page 620)

Venango Engineering Co., Inc.

G and Lycoming Streets, Philadelphia 24, Pa.
Booth No. 144

Textile dyeing machinery will be exhibited.

In attendance: C. Harry McCandless, Sales Manager; J. Fred Slaughter, and Edwin F. Slaughter.

Weston Electrical Instrument Corp.

614 Frelinghuysen Ave., Newark 5, N. J.
Booth 497

The following will be exhibited: industrial instruments including speed-ratio tachometer, humidity indicator, relays, resistance thermometers, indicating and recording controllers, and mill-servicing equipment.

In attendance: R. T. Pierce, Russell Ranson, Grier Wallace, Jr.

—♦ ♦—

Textile Printing—

(Concluded from Page 624)

APPLICATIONS

The practical value of an accurate method of dye analysis was clearly illustrated during a research study of vat printing carriers. Two 10% type, Pink FF printing pastes, which differed only in that a starch carrier was used in one and a carboxymethyl cellulose (CMC) carrier in the other, were formulated in the laboratory and prints were prepared on cotton from identical engravings. Both unaged prints were analyzed for their dye content by the Extraction Procedure. The analytical data showed that the CMC print contained only 60% as much dye as the starch print, indicating that the same engraving picked up and deposited only 60% as much of the CMC printing paste as of the starch paste. This unexpected result clearly pointed out one of the factors responsible for the poor color value of prints prepared with a CMC carrier.

To check the analytical results further, a carefully controlled mill trial was run in which a 15% type Pink FF printing paste containing the starch carrier and then a 30% type Pink FF paste in the CMC carrier were printed from the same engraving onto the same type of fabric. The yardage of printed pattern obtained from each paste and the weight of paste used up at the print machine were carefully measured for each run. The data are presented in Table VIII along with the results of actual dye analyses of identical portions of the printed, unaged fabrics. It is evident that, for equal weights of printing paste used at the machine, the CMC carrier printed twice as much yardage as the starch carrier, in excellent agreement with the results predicted from the original laboratory analyses and also with the analyses of the actual printed patterns.

Other examples of applications of the analytical procedures to research and mill problems in the textile printing of vat dyes will be covered in Part III of this series of papers.

SUMMARY

Two quantitative analytical methods have been developed for determining the vat dye contents of cellulosic prints. In the Extraction Procedure, the oxidized dye was extracted with anhydrous pyridine and the strength of the solution was measured spectrophotometrically. In the Titration Procedure the weight of an alkaline printing paste deposited on a fabric was determined by titrating potentiometrically for the total alkalinity of both the print and the printing color paste. The dye content of the print was then calculated from a knowledge of the dye content of the original printing color paste.

The Extraction Procedure has been applied both to unaged and to developed prints of a number of commercial vat and soluble vat dyes. The Titration Procedure has been applied to unaged prints of vat dyes and vat dye mixtures.

REFERENCES

1. Willard and Thompson, *J. Am. Chem. Soc.*, **52**, 1893 (1930)

2. Jacoby, "Factors Affecting Color Yield in Vat Color Printing" *Am. Dyestuff Reptr.*, **33**, 502 (1944)

3. Neale, *J. Colloid Science*, **1**, 371 (1946)

4. Boulton and Morton, *J. Soc. Dyers Colourists*, **55**, 481 (1939)

5. Specht, *Am. Dyestuff Reptr.*, **37**, 110 (1948)

6. Kienle, Royer and McCleary, *Textile Research J.*, **16**, 616, (1946), *Calco Technical Bulletin* No. 792

7. Zimmerman and Royer, *Textile Research J.*, **18**, 615 (1948), *Calco Technical Bulletin* No. 808

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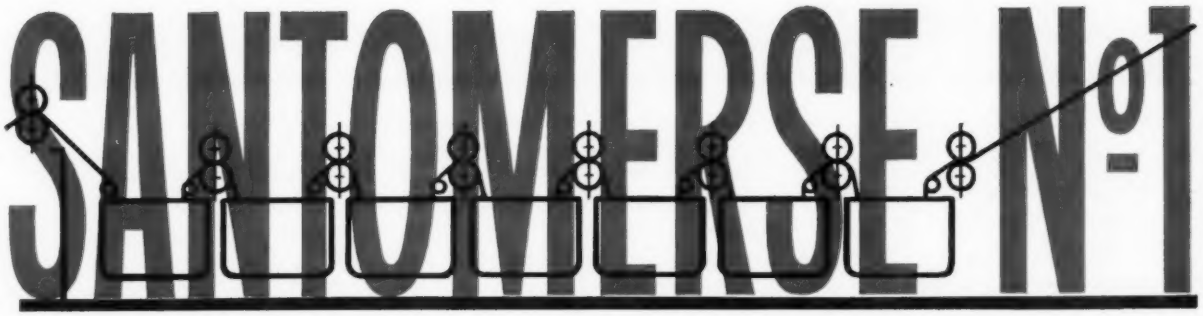

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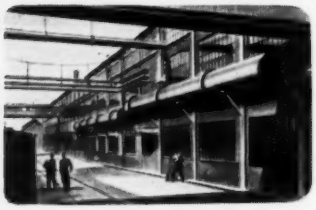

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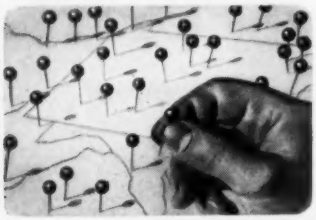

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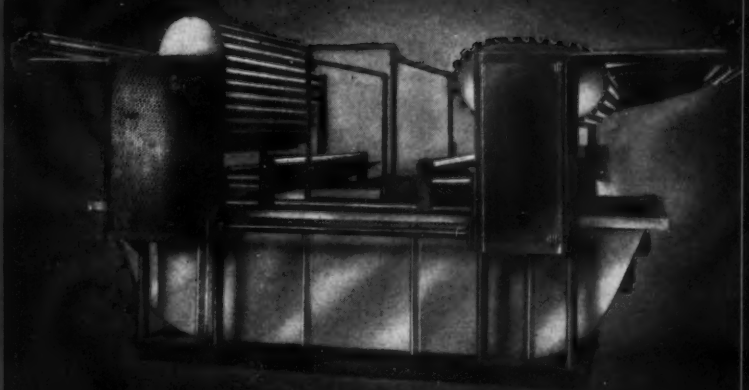

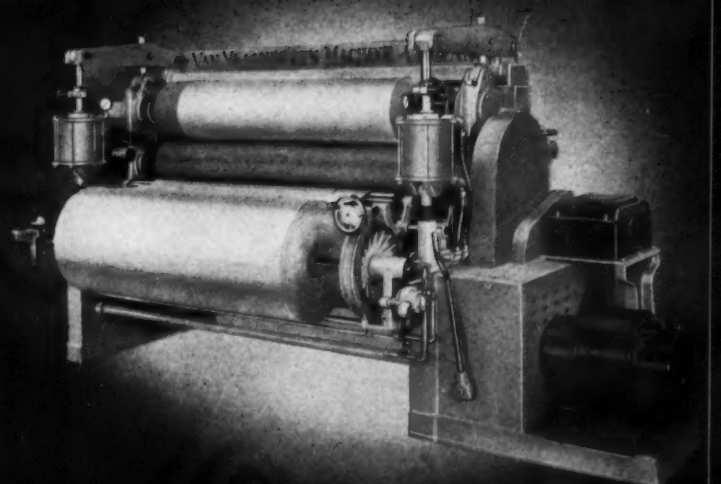

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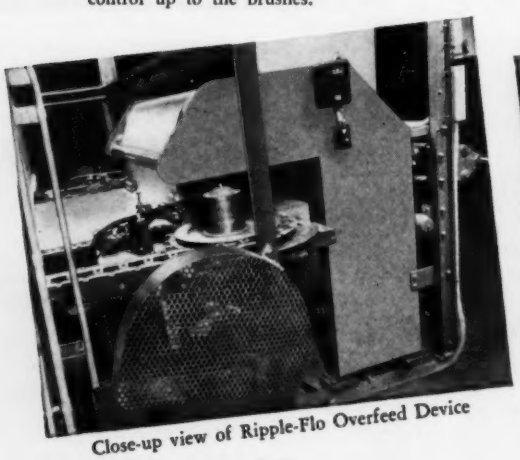

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